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1859

CAPE OF GOOD HOPE

PARLIAMENT

LEGISLATIVE COUNCIL

COMMITTEE TO CONSIDER THE
DOCUMENTS RELATIVE TO THE
HARBOR OF REFUGE IN TABLE
BAY

PROCEEDINGS





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CAPE OF GOOD HOPE.

REPORT AND PROCEEDINGS

OF THE

COMMITTEE OF THE LEGISLATIVE COUNCIL

APPOINTED TO CONSIDER THE DOCUMENTS RELATIVE TO

HARBOR OF REFUGE IN TABLE BAY.



Published by order of the Legislative Council.
JUNE, 1859.

CAPE TOWN:
SAUL SOLOMON AND CO., STEAM PRINTING OFFICE.

1859.

[C. BREAKWATER.]

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REPORT

OF THE

COMMITTEE, appointed by RESOLUTION of the Honorable the LEGISLATIVE COUNCIL, dated the 4th May, 1859, to take into consideration the DOCUMENTS relating to the HARBOR of REFUGE in TABLE BAY.

PRESENT :

Mr. WIGHT (Chairman),

The President,
Mr. de Wet, LL.D.,
Mr. Barry,

Mr. Jarvis,
Mr. Mosenthal.

Your committee beg leave to report that they were anxious to avail themselves of the evidence of A. T. Andrews, Esq., the engineer appointed by Government to superintend the construction of the harbor of refuge in Table Bay ; but regret to have to inform the Council that the arrangements entered into with that officer are of such a nature as to preclude the committee from having the benefit of his professional opinion in the various plans submitted for the improvement of the port, without his having first officially communicated with Mr. Coode, in England, even if his Excellency the Governor should desire him to draw up a plan without such reference. It is the opinion of your committee that much valuable time will be saved, and the preliminary works of quarrying, &c., sooner commenced, if the instructions under which Mr. Andrews thinks he is bound to act are rendered of a less stringent nature.

Your committee have, however, examined the colonial engineer, Mr. Scott Tucker, Mr. Skead, and the acting port captain ; and have also referred to the numerous plans of the projectors, and all seem to point to the absolute necessity of such an important work as the breakwater in Table Bay not being any longer delayed.

Your committee also concur in the views expressed by the acting port captain, that the northern pier should only be carried out to two thirds of the length proposed by Captain Vetch, as it will afford complete protection for all ships that call at Table Bay.

Your committee are also of opinion that the breakwater should be constructed upon the same principle or system as that of Portland harbor, in England.

Your committee are also convinced that the works could be most advantageously carried out if as considerable a number of colonial convicts as can be conveniently spared from the roads could be concentrated upon the spot, by which great saving in the expense of maintaining them, as well as in the cost of superintendence, could be effected, and strieter discipline enforced, than by employing them in detached parties upon other works, in which recommendation the committee are fully supported by the opinion of the Superintendent-General of Convicts.

Your committee also agree as to the desirableness of some of the inner works, for facilitating the loading and discharging of vessels, being commenced as soon as possible, as part of the material or debris of the quarries could be used to fill up the valuable ground to be reclaimed from the sea, if these works were carried out simultaneously.

Your committee deem it, however, expedient to bring to the notice of the Council that it appears to them not to be desirable to employ a contractor, as the plans, before the works are completed, will probably have to undergo some alteration, and a contractor might rather obstruct than advance the views of the colonists, in a work of such magnitude, the contingencies of which cannot be accurately foreseen, or laid down in any agreement.

Your committee perfectly coincide in the views of the colonial engineer, Mr. Tucker, that it would be better to carry out the works under the superintendence of an engineer, who might refer any question to a consulting engineer, if he wished to do so, assisted by a staff of competent officers, as the plant, as well as other material that may be required, could be obtained from England, or elsewhere, without the intervention of a contractor.

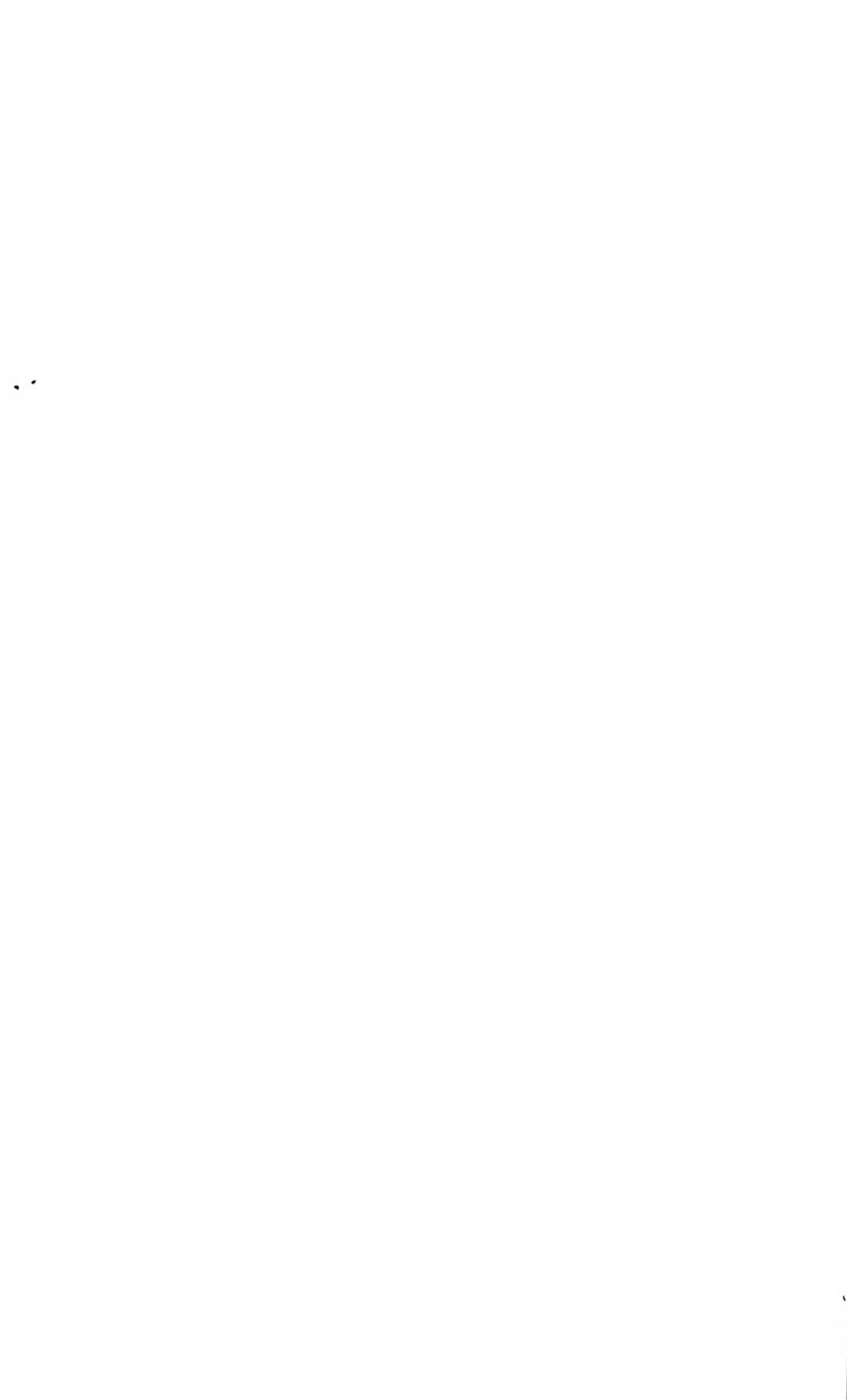
Your committee deem it, however, necessary to submit that it would be far preferable to raise the amount authorized

by the act to commence the work in England, where, they have not the least doubt, it could be obtained on more advantageous terms than in this colony, more especially as the greater part of that amount will have to be applied there in purchasing the plant, as well as other material, tools, &c.

Your committee also submit that it would be desirable that the Executive Government should be requested to ascertain the views of the Board of Ordnance, or the Secretary at War, in England, with regard to such portion of the ground that may be required for the works, and that may be under their jurisdiction, in order that the improvements of the harbor may be commenced with as little delay as possible.

Your committee trust that, when these works are commenced by the colonial Government, the imperial Parliament may feel disposed to assist the colony in an undertaking from which her Majesty's navy, as well as that of other nations, would ultimately derive such great advantages.

J. H. WICHT, Chairman.



PROCEEDINGS OF COMMITTEE.

Friday, 6th May, 1859.

PRESENT:

The President,	Mr. Jarvis,
Mr. Wicht,	Mr. Barry,
Mr. Mosenthal,	Mr. de Wet.

Resolved, that Mr. Wicht do take the Chair.

Read letter from Mr. Andrews to the Colonial Secretary.

Read letter from Mr. Smith to Mr. Andrews.

Mr. A. T. Andrews called in and examined.

Resolved, that Mr. Scott Tucker, Capt. Wilson, and Lieutenant Skead be requested to attend and give evidence.

Committee adjourned to Monday next, at half-past 10 o'clock.

Monday, 9th May, 1859.

PRESENT:

Mr. WICHT (Chairman),

The President,	Mr. Mosenthal,
Mr. Jarvis,	Mr. Barry.
Mr. de Wet,	

Resolved, that the Honorable the Colonial Secretary be requested to allow Mr. C. Piers, superintendent-general of convicts, to attend the committee this day, for the purpose of giving evidence.

Mr. Scott Tucker called in and examined.

Mr. C. Piers called in and examined.

Committee adjourned to Thursday next, at half-past 10 o'clock.

Thursday, 12th May, 1859.

PRESENT:

Mr. WICHT (Chairman),

The President,	Mr. Mosenthal,
Mr. Jarvis,	Mr. de Wet.

Mr. Francis Skead called in and examined.

Capt. Henry Wilson, acting port captain, called in and examined

Committee adjourned to Tuesday next, at 11 o'clock.

Tuesday, 17th May, 1859.

PRESENT:

Mr. WIGHT (Chairman),

Mr. de Wet,
Mr. Jarvis,

| Mr. Barry,

The chairman read communication from Mr. Chisholm, on breakwater, dated 10th October, 1826.

Resolved, that the chairman draw up a report, and submit the same to the committee at their next meeting.

Committee adjourned.

Friday, 20th May, 1859.

PRESENT:

Mr. WIGHT (Chairman),

The President
Mr. Barry,

| Mr. Jarvis

Mr. Jarvis puts in two tabular statements, signed H. Wilson, acting port captain.

The chairman submitted draft report, which, after being discussed, was adopted.

MINUTES OF EVIDENCE.

TABLE BAY BREAKWATER COMMITTEE.

Friday, 6th May, 1859.

PRESENT :

Mr. WIGHT (Chairman),

The President,
Mr. Barry,
Mr. Jarvis,

Mr. Mosenthal,
Mr. de Wet,

Mr. *A. T. Andrews* called in and examined.

1. *Chairman.*] You are engaged, I believe, to superintend the works proposed for the improvement of Table Bay!—
Yes; as resident engineer.

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2. You have examined the plan of Captain Vetch?—I have.

3 Does it strike you that the plan will answer the purpose?—That is a matter that must be entirely left to Mr. Coode; I can only report to him the examination I have made.

4. Can you give any opinion upon the matter?—I cannot.

5. Have you examined the ground in the vicinity of the proposed site of the breakwater?—Yes, the whole; the bay, the shore, and the land for quarries.

6. What is your opinion with regard to the stones and quarries?—As far as I have examined at present, I think they will be suitable for the breakwater; it is very good stone.

7. Do you find every facility existing for using it?—As an engineer, I think it lies very convenient.

8. And the stone, you think, is of sufficient strength to resist the action of the waves?—It is very suitable material.

9. With regard to the labor, do you think colonial convicts may be profitably employed?—I have not yet seen any work performed by convicts at the Cape; when I have, I shall be able to give an opinion

Mr. T. T. Indreux. 10. As to the cost of the stone pier, can you give any information?—I have formed some idea, but I should hardly like to pledge my word.

11. And can you not state any opinion as to the plan, whether the Parliament should sanction the one proposed or not?—That is left entirely in Mr. Coode's hands.

12. I am sorry your position does not allow of your giving further information?—These are matters which are left to Mr. Coode, as consulting engineer of this work, who will prepare a plan and put it into my hands to carry out. I decline giving my own view on the subject.

13. *President.*] Were you at Portland at the commencement of the works there?—No; I have not been engaged on the Portland works at all; for the last twelve years I have been engaged with Mr. Rendall, carrying on other works.

14. Do you know that when the Portland breakwater was carried out some distance, some amount of security was given to the shipping?—Without doubt, when they got some considerable distance out; the shipping found the benefit of the breakwater, as a harbor of refuge.

15. How far out was it carried?—I cannot say; it is about six thousand feet out now.

16. What I wish to know is this: how soon after the commencement of the breakwater, any shelter would be afforded to the shipping?—I cannot say.

17. Would it not do so at a thousand yards?—I should certainly say that when it is a thousand yards out, the shipping would feel the benefit of it.

18. And what is the whole length now of the Portland works?—I think they are about five thousand seven hundred feet now. There is a blue-book published in which Mr. Coode gives particulars regarding them.

19. Have you turned your attention to the present accommodation for shipping in Table Bay?—I think it is as bad as in any port I have ever seen.

20. Do not you think that proper piers are wanted?—It is not so much the piers, as the evil of having everything conveyed to and from vessels in cargo boats. It was only the other day that I saw one of those boats sink.

21. Ought not proper cranes to be provided for loading and unloading vessels?—I was never in a port where cranes were not required.

22. Should there not be such additional conveniences for shipping?—Not without more shelter than at present.

23. Do you mean to say that an additional pier would not be a good thing?—Not without a breakwater.

24. Would it not be a convenience if vessels could discharge alongside a pier?—I think that in Table Bay it would be a great accommodation if vessels could so discharge.

25. And could not that be done by having better piers?—No, certainly not; were a pier run out into Table Bay, a vessel alongside would tear the pier up, or else tear her bulwarks away.

26. A pier would be of no use, then?—Not without some shelter.

27. Now, with regard to this work: supposing a contractor was to send in a tender for its execution, as provided in the act, I suppose he would be obliged to ask a larger price, by reason of the uncertainty of its completion?—My opinion is that you would not get a respectable contractor to execute the work on those terms; that is, the chance of money being obtained to complete it.

28. Why could the work not be done here?—There are two or three reasons for it. In the first place, it would require the colonial Government to have an establishment in England.

29. Why would that be absolutely necessary?—You must have an establishment, as it would be necessary to have everything prepared there.

30. Could not the colonial Government order the requisite articles to be supplied?—The contractor in England must then become a part-contractor to the breakwater.

31. Do you mean to say we could not write home?—Yes, to a contractor.

32. Am I to understand that you could not send for whatever you wanted?—Not unless I sent to a contractor; they could be obtained through an agent, but there would be great delays.

33. Does Mr. Leather provide himself with everything?—Yes, he has an establishment at Portland for manufacturing every article he requires—even his locomotive engines. There are several hundred persons employed there; and it is the same with all other large contractors in England.

34. By putting myself in communication with these persons, could I not obtain these things?—By having good contractors in England you could.

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35. And they would send me all that was wanted?—Yes, for which you would have to pay a very high price, and there would be great detention in the works here.

36. Then it would not be impossible?—In engineering there is nothing impossible.

37. Did you read the act of Parliament for the construction of a harbor of refuge in Table Bay before you communicated with the Colonial Secretary?—Yes, I read it once or twice.

38. Did you not see that it only provides for the commencement of the work?—I did not read it so; I read it as an act for the entire construction of the northern breakwater, and other works.

39. The act says, “Whereas it is expedient to repeal the Act No. 11, 1857, entitled ‘An act for promoting the construction of a harbor of refuge in Table Bay, and to make other provision for improving the said harbor;’ and whereas the improvement of the said harbor would be best effected by taking as a basis the plan of Captain James Vetch, referred to in the preamble in the act aforesaid; which said plan, signed by the Colonial Secretary, is now deposited in the office of the Registrar of Deeds at Cape Town, and by carrying out the said plan, or some plan of the same nature, gradually, and by degrees, as circumstances will permit, the Governor of this colony for the time being shall, after the passing of this act, direct a competent engineer or engineers to construct and cause to be constructed such an outer pier or breakwater as is described on the said plan, or such part or parts thereof, or other necessary works in connection therewith as he may think fit.” Now, is it your impression that those who passed this act had supposed that £250,000 would be sufficient to do the whole work?—I supposed that the £250,000 was intended for the construction of the outer pier or northern breakwater. I read the act as having reference to the whole of Captain Vetch’s plan, which is made up of the north pier, the eastern arm, and several inner works, and that the terms gradually and by degrees referred to each of these complete in itself.

40. But you have said, that shortly after the Portland breakwater was commenced, it gave some protection to the shipping?—Yes; after it was carried out one thousand yards, some protection was given.

41. May not some shelter be afforded in Table Bay when the works are partially proceeded with?—A certain amount,

but not equal to what would be required. One thousand yards would not shelter enough deep water, and large vessels would not come in there. If you made it known to the world that Table Bay was a harbor of refuge, something more than that would be required.

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42. Have you any objection to answer this question: Captain Vetch thinks that two stone piers, going on simultaneously, are required?—From my examination of the port, I think that only one stone pier is necessary.

43. Can you say what amount of accommodation would be given if £250,000 were expended?—If I had the work in my hands, I should be very sorry to make an estimate at present; for I find that circumstances connected with labor, and everything else here, are very different from what they are in England. I could not say until I have had experience of the convict labor.

44. Mr. *Mosenthal*.] How many feet will the proposed breakwater extend from the land?—Five thousand eight hundred feet is the whole length of the proposed pier; six thousand feet it may be taken at.

45. That is the north pier?—Yes.

46. *President*.] You gave me yards for the Portland breakwater: I think you said yards?—I said five thousand seven hundred feet.

47. Mr. *Mosenthal*.] If it is five thousand eight hundred feet in length, it will afford protection to the bay?—Yes, that is, the northern pier will shelter the greater portion of Table Bay from north-west gales.

48. So that vessels may lay inside in safety?—Safely.

49. Could a vessel of large tonnage do so?—Yes, there would be thirty-eight feet of water at low water. Indeed, as far as depth of water is concerned, the *Great Eastern* might lay inside.

50. Would she be in danger from a south-easter: it has been asserted that if we were to construct our pier without the other arm, vessels would still be exposed to danger?—The south-east winds would affect vessels; but I consider that if proper moorings were laid down in one or two tiers, any vessel might ride in safety.

51. Any vessel might ride safely then at these permanent moorings?—Yes; they would be laid with anchors or screw moorings. Screw moorings have been found to be the best in England, if there is good holding ground.

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52. In reference to what has been alluded to in regard to the piers, could vessels discharge alongside in a south-easter? —They want carrying out; there is no depth of water: they must also be built very strong.

53. You are aware that traffic during the whole summer season is frequently interrupted, as vessels cannot be discharged when the south-east winds prevail?—Yes; I have had a return made to me by the port-master, at least he is now preparing it, showing the number of days on which cargo cannot be taken on board or discharged during a south-easter; I think it something like six or seven days a month.

54. Don't you think, then, that any amount of money laid out to strengthen and improve our piers, so as to enable vessels to discharge, would be an advantage to the bay?—That is a point I have not turned my attention to.

55. It stands to reason that a great deal of time would be saved?—I am quite aware of the great loss of time and enormous cost incurred by discharging vessels as at present.

56. Don't you think any amount of money spent would be well spent?—I cannot say; I have not turned my attention to the improvement of those jetties at present; that is contrary to my instructions. It appears to me a wonder that they stand as they do: the vibration on them rather astonishes me.

57. Captain Vetch estimates the whole cost of the undertaking, according to his plan, at one million pounds sterling. Now, granting the eastern arm to be left undone, what would be the probable cost of the rest?—I have not seen any details in Captain Vetch's estimates; I think it is merely a round number that is stated: besides, it would be necessary to ascertain the cost of the other materials.

58. By the materials you mean the machinery, timber, and the like?—Yes; there is all the framing and iron-work. The timber should be brought from England.

59. Have you seen any kind of our colonial timber?—Only some I saw a few days ago from the Knysna.

60. Do you think you could use it?—I don't think we could; we could get some from England much better. I have observed that there is a great quantity of sea-worm, which would soon destroy colonial wood; and it would be necessary to have some from England which could stand the worm.

61. Have you seen any that is called sneezewood : do not you think that would suit ?—I do not think it would.

62. You are aware that the Port Elizabeth breakwater is constructed of this wood ?—No, I was not aware.

63. Could teakwood or any other woods be used ?—Nothing withstands the worms. Some time ago I constructed a wharf with African oak ; but it was eaten by the worms just in the same time as soft fir. I have not seen any wood that would withstand the worms with the exception of greenheart.

64. Then you think that wood must be got from England ? Yes ; the timber is prepared at home. It is impregnated with creosote ; and in that condition it is found to stand the worm.

65. Could not that process be done here ?—Yes ; but I think it could be cheaper done in England. Vessels do not like bringing out such cargoes ; several were lately sent to India, but they have great difficulty in getting it carried out now.

66. Have you any idea of the amount of timber required for constructing the north pier ?—No.

67. Captain Vetch stated that the pier need only be thirty feet broad : you have stated that it is to be three times broader than Captain Vetch proposed ?—I do not think the width is mentioned in Captain Vetch's report ; but I had a conversation with some person who said that thirty feet was only laid down—that is on the top. This section I have brought from England shows the Holyhead breakwater to be from one hundred to one hundred and twenty feet on the top, that is, at high-water mark, ordinary tides. The red line shows the shape of the stone bank when first deposited, and the brown color the shape assumed at present. This alteration is entirely caused by the action of the sea, and you cannot make it in any other form with safety. The erection on the crown of the breakwater is a solid wall of masonry, about seventeen feet thick, to act as a back-bone to the work.

68. Well, could not the timber be got from the Baltic ?—I have no doubt it could.

69. It would come from Memel as we get cargoes of wood out here ?—Yes, but a great deal would have to be American. Those main beams are fourteen inches square, and from thirty to forty feet in length.

70. Then I understand that the width of the bottom ought to be from three hundred to three hundred and fifty

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feet?—No, I do not say it ought to be, but the breakwaters in England are formed so.

71. Ought it to be as strong?—I should say so.

72. Then the idea of thirty feet of width at the top is entirely false?—I think it would be found to be increased by the sea to more.

73. Have you made surveys of the bay?—We are now engaged about them; and Mr. Skead, the admiralty surveyor, is assisting me.

74. Can you state the average depth of water?—I cannot state positively at present, the chart shows an extreme depth of twenty-eight feet at the inner arm, and thirty-eight feet at the outer arm, at low water.

75. What would be the soundings if carried out one thousand feet?—The first one thousand feet would give an average of twenty-three feet at high water.

76. Twenty-three feet deep at the first one thousand, and forty-three at four thousand?—Probably about that. At the first one thousand feet the depth would not be above twenty-two feet at high water.

77. And at the next four thousand eight hundred?—Would be about forty-three feet, that is the average.

78. And you estimate the cost of the five thousand eight hundred feet at half a million?—No; I should not like to make an estimate, I am not in a position to do so; but I think £500,000 should be prepared to carry on this work.

79. Do you think it could be done at that?—I do not think it will be less; but, as I have said, it is impossible for me to make an estimate.

80. Do you think that by spending half of that amount, £250,000, we could materially benefit the present anchorage?—That is a question I should not like to answer, it is so very foreign to my instructions. If I was in the position of engineer-in-chief I could answer the question at once, but as I have Mr. Coode above me, it is rather a delicate matter for me to express an opinion upon.

81. Suppose now, for argument's sake, that the north pier could be constructed for half a million sterling, do you think that two thousand nine hundred feet could be constructed for a quarter of a million sterling?—The cost and expense of laying out the first part of the five thousand eight hundred feet would, of course, be very great, as the plant, &c., must be purchased, the railways constructed, and the

quarries opened. These expenses will be nearly the same for a short as for a long breakwater.

82. What would be the preliminary expenses?—That is an estimate I could not form at present. It is for Mr. Coode to decide upon the manner the work is to be executed.

83. Well, state the preliminary expenses at any amount you please, and taking the total cost to be £500,000, have you any idea of how far the money voted would go towards the construction of the pier into deep water?—It is not my opinion as to how it can be constructed, but what Mr. Coode will decide upon; I may give a decision of which Mr. Coode will not approve.

84. You understand that we do not want to have an estimate?—Yes; but I should not like, in my present position, to give any opinion without Mr. Coode being consulted, and his views being ascertained.

85. How many laborers would you propose to be employed upon this breakwater?—I should say about one thousand men.

86. Must they be skilled or inferior men?—I should say seven hundred convicts, and three hundred skilled laborers to be brought from England.

87. Would all be engaged on the work at the same time?—Yes.

88. And, if these one thousand men should be constantly employed, how many years would it take to construct the five thousand eight hundred feet?—That is a question I cannot answer.

89. Make a rough calculation, would it take five years?—Yes, from five to six years I think; but it is quite a guess. I could not state any exact time without further calculation of the quantity of work to be executed.

90. Consequently it would take six years, and absorb £500,000 or £600,000 sterling to construct it entirely?—The first year there would not be so much done and the expenditure would not be so great, and it would be the same in the last year.

91. Supposing that it was commenced on the 1st January, 1860; then, in 1863 the £250,000 would be spent?—No; because about the end of the first year, the contractor would find the outlay fall heavily upon him for the necessary plant and material for the work.

92. In how many years would you consume a quarter of

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a million pounds sterling, supposing the outer pier or breakwater to be carried out!—I should think about two years or two and a half years, perhaps.

93. You cannot give us any guess as to how far the works would then be proceeded with, I mean carried out into the sea!—I could not form any approximate idea; there is so much work to be done in opening quarries, laying down inclines, &c.

94. Do you say, then, that we cannot spend this quarter of a million!—No. Decidedly you can; but I cannot tell you what would be done when this sum is spent.

95. Are your instructions of such a nature that if his Excellency the Governor were to request you to draw up a plan, you would not do it, although you would not be tied to any amount!—I should certainly decline to do it were the Governor to ask me. It would be putting me in such a position, in respect to Mr. Coode, as I should not desire. I am to look to him for instructions; and, before I came out, my instructions were, to examine Table Bay, with the object of having a breakwater carried out from near the Chavonne Battery. I may say that a copy of my instructions has been placed in the hands of Mr. Rawson; and it would be well if these were laid before you or upon the table of the House.

96. According to the plan of Captain Vetch, the outer pier will only give shelter from the north-west; is not the eastern pier also required to prevent the bay silting up. Can you give us your opinion on that point!—I do not think it will. That, however, is a matter on which I will report to Mr. Coode. I consider there is no fear of silting up in the bay; that may be reported to the whole world.

97. And by means of moorings, men-of-war or any class of vessels may lay there safely during a south-easter!—If proper moorings are laid down here as in Portsmouth, Plymouth Sound, and other places, men-of-war or any vessels may lay safely. If they are badly found, of course they must take the consequence; they may part their cables and get adrift.

98. Is there no means of securing Table Bay against the south-east wind!—The effect of the south-easters is due to the wind acting on the vessels; the effect of the north-westers is due to the great sea that runs in.

99. Would vessels in the inner works, as shown in Captain Vetch's plan, lay safely inside the sea-wall!—Yes.

100. Could they lay alongside, inside the outer pier or arm, to discharge cargo in a south-easter?—Certainly not.

101. What additions to the north pier would be necessary to enable vessels to discharge in a south-easter?—I do not think it was ever intended for vessels to discharge alongside that pier.

102. I know that very well; but could a pier be run out to enable vessels to lay there in safety?—Some works could be laid out, certainly.

103. Such a work would require to be of some magnitude?—They must, no doubt. Sufficient depth of water would be necessary.

104. Then a pier could be run out from the breakwater?—Yes; when I mentioned works I meant jetties. You will see that Captain Vetch alludes to something in his report. He says: "If found necessary for the accommodation of merchantmen, other timber jetties may be added." These jetties, if carried out, in deep water, will be found very expensive works.

105. Has any similar work been constructed in any British colony to your knowledge?—I have heard of some, but I cannot exactly say where. There was one in Australia, but it was of a smaller character. It was run out one hundred yards into the sea in two fathoms water.

106. Has Holland done anything of the kind, to your knowledge?—I cannot remember of any works like this, with the exception of Cherbourg and Algiers.

107. Is there anything like it in the West Indies?—I cannot recollect.

108. In America?—There is a work of this sort in Delaware Bay.

109. But there is none in any colonies, that you know of?—No, neither British nor foreign.

110. If it was found necessary to raise funds to complete the works, do you think there would be capitalists in England willing to lend the money?—That is a question more for capitalists. I can only say that when I left England money was plentiful.

111. Do you think that if we were to construct this work, the amount of shipping in Table Bay would increase?—My knowledge of the shipping is very small; but I should say most certainly that vessels would come here, which now give it a wide berth.

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112. Her Majesty's vessels would find it a secure anchorage, and therefore choose it?—I cannot say that. The people at the Admiralty frequently have curious opinions.

113. But would not Table Bay be a safe anchorage?—Most certainly; if the proposed breakwater is carried out Table Bay will be a very safe harbor.

114. And ships of the largest kind could lay inside?—Yes.

115. Are the other works included in your rough estimates of half a million sterling?—That is merely an idea, not an estimate. Under the circumstances I am placed in, it is not prudent for me to give one.

116. Mr. *Jarvis*.] The accommodation for the shipping inside the outer arm would, I believe, be ample?—Yes, we know the length of the breakwater, and the depth of water is apparent, and I see no reason why the largest fleet should not lay there; and the anchorage is safe.

117. You say that you have surveyed that part of the bay in the vicinity of the site proposed for the breakwater?—Yes.

118. And you have placed your buoy at the extreme end of the breakwater?—The buoy laid in the bay at present is very near the spot marked on the plan as the light-house; we laid it down to give the port-master and other nautical men an idea how far out it was proposed to carry it.

119. What amount of area does it cover?—I would suppose, from Captain Vetch's report, it covers six hundred and seventy-six acres.

120. Have you been to Fort Knokke and seen the buoy from there?—No, I have not.

121. Then you cannot form an exact idea of the area covered?—The line of the buoy lies between Robben Island and the main, about one half of the distance between Robben Island and the shore, towards Salt River.

122. Then, in fact, it covers all the space on the west side and one half beyond that to the east?—Yes.

123. Do you think, then, the space necessary to afford security to the shipping requires you to extend it so far as that?—That is a point I cannot answer; Captain Vetch thinks it is requisite, and he is a greater authority than I am. But I may mention that this north pier might be shortened, how much I would not like to say, but I think it might be made a little shorter; but this is for Mr. Coode's decision.

124. That would save the expense, of course?—Yes.

125. Are you aware of the annual expenditure of the Portland breakwater?—My recollection does not serve me at this moment.

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126. Is it twenty thousand pounds a quarter?—A parliamentary return which has been published shows it. I think it is about that.

127. What number of convicts are employed?—About nine hundred; they are chiefly employed in the quarries.

128. And of free labor?—About five hundred and fifty men.

129. You were speaking of the wharfs and of giving greater facilities to the landing and shipping of cargo. I suppose you have visited those wharfs?—I have, every day.

130. You know the coaling wharf: supposing that wharf was extended a little further into deep water and the works at the north pier sheltered it, could vessels be taken alongside and discharged?—I am not sufficiently acquainted with the anchorage of the bay there. If there is very rocky ground or reefs it would be dangerous to lay there. As an engineer I would say that if the breakwater was laid out one thousand yards, great shelter would be given, but the depth of water near the wharf is very shallow.

131. Taking the proposed works as a whole, are there any works of a similar kind now being carried on in any part of Great Britain?—I do not think there are any of a greater magnitude; those at Holyhead are very large and extensive, but I do not think they exceed this.

132. Mr. Barry.] You are aware that a current flows round the bay, from Green Point bluff towards Salt River, sweeping the bay of dirt and sand: there is a large accumulation of sand carried towards Blueberg Bay?—The currents round Mouille Point flow very slow and weak with a westerly wind. The lines of current come in the direction of Salt River, where they split in two, one going east and the other west; a great proof of this is that the shore near the custom-house is quite clear. If there was a current from the west, it would be the reverse. If I had charge of the works, I would stop all deposits of filth, such as those near the battery. As to the sand brought down by the winds, it is merely a trifle. I think Captain Vetch had a wrong idea of the blown sands.

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133. Mr. *Jarris*.] You have just stated that you are of opinion that the eastern pier and cross pier are unnecessary for the protection of the bay?—I do not think they are necessary; a slight groyne might be required.

134. Could you give us any idea of the expense of constructing these works?—No, I cannot. An estimate cannot be formed without decision as to the character of the works, and I am not in a position to make a decision in reference to any part of them. Captain Vetch estimates the whole, but there is no work of the kind done in England for the money, and certainly it won't be done here for less.

135. Would you recommend the esplanade which is marked on the plan?—No; I don't think it of any use; that is my own opinion. All my opinions, however, are subject to Mr. Coode's directions hereafter.

136. Mr. *de Wet*.] But supposing the eastern pier was carried out, would it affect the bay?—I do not think it would. Captain Vetch's view is that there is danger from drifting sand from the direction of Salt River. Now, my impression is that there is nothing to fear on that score. Captain Vetch's idea is that the currents set from the east side, but all the evidence is that it is from the west.

137. Would the building of the north pier increase the danger from a vessel getting on the rocks, or otherwise?—If a vessel got too far over there, and got on the pier, it would be as bad as getting on a reef of rocks. You sometimes find such accidents occur. I was at the Tyne when several vessels were lost on the rocks behind the pier head. And at Aberdeen, one of the finest steam-ships in Scotland was lost in the same way.

138. Do you think an arm could be run out from this point, near the light-house, parallel to the Mouille rocks?—The expense of constructing works of that sort would be everything; and the same remark applies to all the inner works in deep water.

139. Do you think the jetties could be improved so as to allow of vessels going alongside?—I don't think the present jetties could. These jetties are placed in very shallow water, and they would have to be run out fifteen hundred feet before large ships could make use of them in that way.

140. Mr. *Jarris*.] In the neighborhood of the Chavonne Battery I believe there is the deepest water?—Yes; there is deep water near the shore.

141. Mr. *Barry*. From your acquaintance with the bay, can you say whether you have seen any locality suited for a dry dock, where vessels might be placed to be repaired?—

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Yes; I think that when the north pier is constructed, under the shelter of it there might be found some place between the Chavonne Battery and the Somerset Hospital. As to the expense: just before I left England I was connected with the construction of a dry dock three hundred and sixty feet long, sixty feet entrance; and the expense of it was about £70,000, including everything. That would take in two vessels. It was at Leith, in Scotland, where the facilities were great—labor and materials cheap.

142. Mr. *Jarvis*.] What is the rise of tide there?—Nineteen feet at spring tide. [Mr. *Jarvis*: And here it is five or six.]

143. Mr. *de Wet*.] May not a dry dock be constructed in such a manner that it may serve to discharge vessels?—It would be too expensive to use for that purpose at Cape Town. I had lately the construction of a dock in London for the London Dock Company, the cost of which was nearly £130,000 per acre.

144. Mr. *Mosenthal*.] You are aware that occasionally ships go on shore here under the light-house at Mouille Point?—Yes.

145. Would you place the light-house on the outer pier, or at the end of the north pier?—I have always seen light-houses constructed at the end; but it would be a point for those in charge of the lights here to decide upon. In all breakwaters, it is placed at the extreme point. But this is a detail that depends on what Mr. Coode would advise.

146. How far would the light-house be seen?—That would depend on its height. It is found that those harbor lights are best which are not seen too far. A distance of eight or ten miles is considered best.

147. Would it prevent such accidents as one which took place lately in the bay when a vessel went on shore?—That I can hardly say, for I am not aware of the circumstances. I understand that the light-house about to be placed on Robben Island would prevent the like of that.

148. Could not the northern arm be constructed a little closer in than is represented in the plan?—No. It would be a very little cheaper, and of great deal less value. I would

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recommend that the breakwater be a little further out. The cost will be the same nearly, and we will have a better anchorage.

149. Would it be cheaper if built more to the south?—It would cost about the same,—perhaps a trifle cheaper; but if built much more to the south, it would be useless.

150. Mr. *de Wet*.] Might not military works be erected in connection with the breakwater?—Yes; it might also contribute to the safety of the place in that respect. Most of the breakwaters lately constructed have been carried out with that view. I spoke to Captain Tilley, R.E., on the subject, having heard that alterations were proposed at Chavonne Battery.

151. Mr. *Jarvis*.] Did he give you any idea with regard to the Chavonne military station?—He mentioned that the War Department proposed to make some alteration there, and he has since written to me to know when the breakwater is to commence.

152. *Chairman*.] Is this plan [referring to section exhibited of Holyhead breakwater] the French system of “*Pierre Perdue*”?—The Holyhead breakwater is on the “*Pierre Perdue*” system.

153. Is this work to be made of masonry [referring to section]?—Above low-water mark a solid wall is built up, to form a sort of backbone to the breakwater.

154. Would not the construction of the inner works in the plan [Captain Vetch’s] serve to break the sea in a south-easter, and make it smooth?—I have never heard of the water in the bay being very rough in a south-easter.

155. If the esplanade were constructed, would it not be favorable for the building of warehouses and the like along the shore?—Yes; but it seems to me that there is a great deal of land now not built upon, and it would be better to use that first.

156. Have you any idea of the cost, per foot, of the Portland breakwater?—I think it is about £85 per foot for the rubble bank.

157. The original estimate of the whole work was £600,000?—I do not know; I understand they have spent £200,000 in works besides the breakwater, such as land, buildings, wharfs, and apparatus to coal steamers at the rate of one ton a minute; so that men-of-war may run in and coal, and out again the next tide.

158. In speaking of the foot, do you mean per foot lineal?
 —Yes. I may state that I have found myself closely tied in matters the committee wish information upon, as I am entirely under the directions of Mr. Coode, who has been appointed engineer-in-chief for this work, and until I receive further instructions from him, I do not feel myself at liberty to give opinion on many points you require explained.

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Monday, 9th May, 1859.

PRESENT :

Mr. WIGHT (Chairman),

The President,
 Mr. Jarvis,
 Mr. Mosenthal,

Mr. de Wet,
 Mr. Barry.

Mr. *Scott Tucker* called in and examined.

159. *Chairman.*] I believe you are the colonial engineer?
 —I am.

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160. You have examined the plan [A] framed by Captain Vetch, for the improvement of the harbor of Table Bay?—I have.

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161. Are there any alterations that strike you, or do you approve of the plan as laid down?—The plan is very comprehensive, and certainly contains many points; but I think it would be judicious to defer its execution, at all events for some time, if not abandon it altogether.

162. Now, more particularly with regard to the north pier, is it not a good position to carry it out: I suppose you know what I mean?—Yes.

163. Does it strike you that any alteration should be made, or should it remain in its present position?—I laid it down as the length of a north pier in 1854, and I do not think, on consideration, that much improvement could be made, except throwing it out a little further to the northward; but that is not material.

164. You speak of some alteration of this plan?—The accommodation for the mercantile community of Cape Town I consider far too extensive, and the protection ostensibly

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laid down for the merchant traders seems to me to be too far from the vessels intended to be protected.

165. Would you suggest anything, so as to prevent vessels being inconvenienced by the south-easters and to enable them to discharge their cargoes alongside the pier?—I have that laid down in the plan I submitted in 1854 [plan B]. My instructions were to submit a plan for the improvement of Table Bay and for the convenience of landing and shipping goods. I consider that those instructions implied a protection for vessels which might occasionally put in for repairs or provisions, and, in consequence, I provided an outer basin of two hundred and fifty acres and an inner harbor or commercial basin of thirty-five acres, by which those two parts of the trade of the place would be accommodated without any interference with the fishing and boating community. There are three parties virtually provided for in my plan of 1854.

166. And, according to your plan, you think the water would be smooth during the south-easters?—I think so, undoubtedly.

167. The vessels could come alongside the quays and discharge?—In the inner basin they might, but not in the outer harbor, for there might be a chance of motion there. I have provided, by my south-eastern pier, for boats dropping down to vessels in the outer harbor that might require assistance.

168. I suppose you would have no objection to lay this before us?—Certainly not; I have it here on a small scale.

169. In your opinion, you do not think: supposing a large Indiaman came in, how would she be accommodated?—My original entrance for that very purpose was laid down at one thousand feet in width, and on my return to England, in 1854, I submitted my plan to the then hydrographer, Sir Francis Beaufort, but he disapproved of the width of the entrance, as he thought eight hundred feet would suffice; and in all my subsequent plans I have laid it down at eight hundred feet. One great advantage that I consider my plan has over that of Captain Vetch's is, that vessels coming in disabled or otherwise before a strong north-wester, if they could not round up or get into the harbor mouth, they might bring to under the lee of the eastern causeway. Captain Vetch's plan includes the ground between Fort Knokke and the Castle, which vessels generally choose to beach upon when driven from their anchors by north-westerners, so

that should vessels in distress miss the entrance, they are likely to go on shore in the quick sands in the neighborhood of Salt River.

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170. Did you calculate the expense of the work according to your plan?—I did; but very roughly.

171. But, at a guess, how much?—I think I stated that £349,000 was the estimate; but I should explain that my breakwater would be merely a surface breakwater, so that the sea coming in might roll over it, and create only a slight surf immediately inside, instead of such a breakwater which would be subject to the drawback of water, which is the most injurious thing it could be subjected to.

172. Mr. *Barry.*] Even on your plan, vessels would be all in perfect safety in a northerly wind?—Yes, in perfect safety.

173. *Chairman.*] As an engineer, what is your opinion regarding the silting up of sand?—I have not the slightest fear of its silting; but all harbors are subject to silting, more or less.

174. And you do not think it would be necessary to keep a steam-tug to bring vessels in here?—It might, of course, be desirable to have a steam-tug. Captain Vetch also provided in his plan “a lofty wall to be erected between the Castle or Fort Knokke, as a further protection to vessels against south-easters, and to prevent the sand being blown into the harbor.” It is quite a novel piece of engineering to me to erect a wall to keep the wind off.

175. Mr. *Barry.*] Perhaps he meant by this to keep the sand off or drifting there?—There is very little, if any, sand, only dust from the road. This is the plan [B] which I have prepared to show how, without endangering the integrity of my whole scheme, accommodation, I think, might be made for the commercial purposes of Cape Town, probably leaving the harbor of refuge to a more fortuitous time, when perhaps money can be better obtained.

176. *President.*] Would there be no danger of silting?—Very trifling; nothing but what a dredging machine could counteract. There is dredging in most harbors. I could deepen this basin, described in the plan [C], to fourteen or twenty feet. By my plan, a basin of forty-five acres could be obtained, and then a quay of forty acres for the building of stores and other purposes. It would become very valuable land, being immediately in the centre of the trade of the port.

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177. (*Chairman.*) What class of vessels would it accommodate?—Vessels of from two hundred to three hundred tons. That basin is as large as the united outer and inner harbors of Ramsgate, where I have seen three hundred vessels at a time.

178. Have you any idea of the expense of constructing this inner basin?—I never entered minutely into it, but my former estimate for the basin was about £150,000.

179. But this land, could it be disposed of?—Yes, very advantageously.

180. Less the expenses of construction?—Yes, it would pay the costs of it, and be an excellent deposit for the quantities of rubbish that must be removed to get at fit stones for the breakwater in the quarry, and for filling up the shallow water to make the land—the deep water being only available for vessels. Captain Vetch also proposes enclosing a great extent of shallow water. There are two reefs of rocks opposite the hospital, drawing half way across his inner harbor, which is, besides, very far from the city.

181. According to your plan, what sized vessels will the outer harbor take?—It would take in the *Great Eastern*.

182. Mr. *Barry.*] Is that plan [C] adapted for the protection of large ships?—Not any above twenty feet draught.

183. *Chairman.*] Reverting to the plan A, the pier, have you not examined the quarries and the ground adjacent: do you not consider there would be great difficulties in conducting the stones towards it?—Not any.

184. You have examined the quarries and the material, and found the stones to be sufficiently strong to resist waves?—Yes, I believe the deeper you go into the quarries, the better the material would prove.

185. At a rough calculation, it is stated that £500,000 would be required for the pier: supposing £250,000 was expended, would it not complete it half-way?—Yes; with that sum the whole length of it on my plan. The Portland breakwater is twenty-five feet above high-water mark; but that would not be, in my opinion, necessary here. I submit a rough section I drew out in 1854 [D], to obtain an approximation to the quantities that would be required. This is my rough section, showing the cost of the work ten feet above high-water mark. Rendel's section shows thirty feet above high-water mark. It was my intention, when I sent in my report and estimate, simply to have a bank of stone to break

the force of the waves, though allowing their crest to run over; and that would not injure it in the least.

186. *President.*] The Portland breakwater is in shallower water?—Sixty feet of water in some parts.

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187. And the shallower the water the easier to make, I suppose?—Decidedly.

188. *Chairman.*] Do you think convicts should be employed in getting out stones?—I think so, provided they are properly handled. I worked with convicts four years in Bermuda, but we had great powers over them, in having the power to recommend commutations of their sentences, which acted as a great spur.

189. *President.*] That is the system there now, is it not?—At times, I believe, it is.

190. *Chairman.*] As that would reduce the expenditure considerably, the convicts would still have to be maintained, whether they are doing this or not?—To employ the convicts here you must take them off the roads and neglect those roads to some extent, or else engage hired laborers upon them.

191. In commencing at the land side, do you think it will be necessary to carry staging as far as the pierhead goes, or, as you progress, lay your rails and stagings?—I think staging would be necessary the whole length, especially in my plan.

192. *President.*] I have seen at Portland that as they go on they increase the staging?—I would merely erect staging as the work progresses.

193. I gather from this plan that you are in favor of giving not only protection to large vessels, but also immediate convenience to the commerce of the port; one by means of the basin and another by the great pier?—Yes. I consider the commerce of the port is the first thing to be attended to. When the commerce increases, money will be provided for additional works.

194. If it were thought advantageous to put a large body of convicts on the intended breakwater, might not the two works be going on simultaneously?—Undoubtedly; I recommended that in 1854.

195. The convicts must be kept by the Government wherever they are at work, and therefore, if a large body of them, say seven hundred or a thousand, were occupied on the projected pier, do you not think an arrangement could

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be made for keeping up considerable discipline, and all at a moderate expense!—Certainly; I think the more you have the more economically they can be provided for.

196. And discipline—could it be kept up in a large establishment!—Decidedly.

197. Do you think it would be preferable to having them in small bodies scattered over the colony!—As far as economy is concerned and supervision.

198. Supposing the pier was constructed by convict labor chiefly, what would be the additional expense added to the convict establishment: what would be the plant required to commence the breakwater, going on by degrees,—setting aside the cost of the labor!—The plant to be provided in the first instance would be very costly.

199. How many locomotives would you think necessary?—Probably begin with four, and increase as the work progressed; working from the two points, as has been suggested.

200. I am confining my inquiries to the breakwater without reference to the other work!—Probably two in the first instance.

201. What is about the cost of these?—For £1200 I think we could get a good one.

202. Then, being provided with two locomotives and a large body of convicts, what other plant and material would be required to make a commencement!—Rails, switches, stages, drums, screw-jacks, cranes, and all the appliances in working quarries, similar to those at Portland, but not to so great an extent.

203. You would require timber as the length of the pier is advanced!—Yes.

204. Do you think £50,000 a year, with the addition of convict labor, would serve to make any impression in the way of erecting the pier!—It would be most beneficial.

205. You think you could make progress!—Decidedly, great progress.

206. Well, then, with regard to your proposed commercial basin of forty-five acres, what quantity of land would you propose,—forty acres!—Yes, about forty or forty-five acres. I do not take the extent shown by the northern red line. A great part of this would be shelving, not available for building purposes, owing to the break of the sea; but this north pier and basin altogether is so far sheltered by

the land at the Chavonne battery as not to be entirely exposed to the violence of the north-west gales. The main work, if constructed, would be a great protection.

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207. And the more this arm projects, the greater the protection to this arm of the basin?—Undoubtedly.

208. The only difficulty I feel is in regard to the silting. It is all sand, is it not?—Yes, at the bottom of the bay.

209. The operation of silting is, when a sea lashes on a sandy shore the sand is taken up in suspension and drifted in and deposited?—That objection would hold against all basins, but such sand is removed by dredging machines in all harbors.

210. Supposing you used a dredging machine to clear the basin, would it not be dangerous to the bay to throw it over, except by going out a great distance with it?—Certainly, clear of the anchorage.

211. That would make the thing rather expensive?—No, I think not. At Malta they dredge considerably, and they used to take the stuff outside the harbor.

212. What is to be the depth of water inside?—Eighteen to twenty feet.

213. I presume you would have cranes for the landing and shipping of cargoes, and you would arrange for the requirements of the trade, sending one set of vessels to one side and another to another?—Yes.

214. Are there any cranes at work now?—Yes; at the landing wharfs there are cranes working.

215. What would be the depth of water at the entrance?—Twenty feet. I would remark I have altered the slope of the north pier of this basin, perceiving that this outer north breakwater would not be carried out at present.

216. Would you think it advisable to use convict labor for the basin, or limit it to that other work?—I would use it for the basin, but it would not be advisable to bring the convicts so close into town; but probably they could be employed in carrying the stones to the basin, leaving it to the other laborers to deposit the same, as at Portland.

217. Can you give a rough guess at the cost of this basin within £20,000?—Yes, I should say about £180,000; but I have not considered the matter minutely.

218. Is that plus or minus the value of the land?—Minus the value of the land.

219. Would any great cost be incurred in clearing out the

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basin?—No, not at that depth of water. Basins in muddy rivers have a quantity of sand deposited, which necessitate deepening very often; but that would not be the case here. There has certainly been a great deal of filling up on the north side of the central jetty, which has alarmed some parties; but it seems to have been occasioned more by the laying of town rubbish than silting. I have noticed the rocks under the Chavonne Battery are perfectly free from sand, and therefore it is not probable that the sand would grow to any great extent.

220. What kind of stone would you use to form the walls of the basin?—Rough square stones. I would put as much labor as I could on the material.

221. And would you find the same stone in the same quarries?—Yes.

222. How would you conduct it down to the quay?—In trucks on a tramway.

223. Without interfering with the streets much?—Yes, without interfering much with them, though in towns such works do create some interference.

224. You have no doubt the basin could be kept clear at eighteen feet?—Not the slightest.

225. Mr. *de Wet*.] You mentioned convicts: do you mean colonial convicts?—Yes, colonial convicts, perceiving that there is great objection to home convicts. I like the home convicts myself, for I have worked with them, and never met better men for work.

226. Suppose the breakwater was built, would not that prevent an accumulation of sand in the harbor?—If the outer breakwater was carried on instantaneously with the inner basin, I do not apprehend any deposit of sand.

227. So that if these works proceed at the same time, protection would be afforded against the north-westers and south-easters: would that do away with all the difficulties in the way of landing cargoes?—In the basin vessels could lay alongside the quays at all times.

228. *President*.] Vessels of three hundred tons?—Yes. of three hundred tons.

229. Mr. *de Wet*.] And when they were discharged, they could take their anchorage in the outer basin?—Yes. The outer breakwater also renders it easy to have proper slips, which this commercial basin alone could not have.

230. I see you do not get more depth of water than fourteen to twenty feet in the inner basin. The difference is small?—Yes, very small. But this plan [C] is marked different to the other [B].

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231. What is this intended for?—Merely a causeway for boats to ply in safety under.

232. Would there be anything to prevent large vessels lying behind this causeway; could it be made of sufficient strength so that these vessels could be attached?—Certainly it could.

233. And the causeway itself, would it give communication to the town?—Yes; but not for general use.

234. Still, not such as to prevent the vessels having taken shelter from discharging their cargoes?—They might moor or anchor immediately under it.

235. Mr. Barry.] The inner basin only gives accommodation to vessels of three hundred tons. Do you not think it would be more desirable to erect first the outer breakwater, in order to give protection to large vessels coming from the eastward. Evidently this port loses by not having a place of shelter for vessels in winter, such as a breakwater might give to larger vessels. This other work might be considered after, or, perhaps, be begun simultaneously. Would it not be desirable to have the breakwater first, and then the other?—No; I do not think so.

236. It would only give accommodation to certain vessels, and therefore be merely of a limited use?—This northern breakwater only affords protection in northerly and south-westerly winds; but in south-easters, the trade would still be as badly off as ever.

237. Mr. de Wet.] Would anything prevent vessels taking shelter?—The whole of this half of the bay is protected.

238. But I presume, if we decide this year that one is to be made, it should be the breakwater?—If only one be commenced, I would recommend the commercial basin.

239. Can you not then construct the causeway?—I propose the causeway only as the work was completing. I altered the direction [C], presuming that the outer harbor would not be constructed till some time after.

240. Mr. Barry.] You think the breakwater could be constructed for £250,000?—Yes.

241. President.] With convict labor?—Yes.

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242. Mr. *de Wet*.] And that would give sufficient protection to this causeway?—Yes, undoubtedly; you break the whole of the swell, and there would be nothing but agitated water under its lee, from the surf running over it.

243. Mr. *Barry*.] Would not that tend to fill up the outer anchorage, and cause an accumulation of sand?—Not on so very extensive a surface as two hundred and fifty acres.

244. Were you ever at Barcelona?—Never.

245. There is a breakwater there, and I saw, when I was a youngster, and happened to be there, the whole of the harbor filled up?—Plymouth Sound is under the lee of the breakwater, but they keep dredging machines to keep up with the silting.

246. Mr. *Jarvis*.] You have stated that you had reason to alter the plan you first submitted to the Government with regard to the construction of this harbor of refuge?—Slightly, I have; but very slightly.

247. You have seen the plan of Mr. Rendel?—I have. I have got a copy here [E].

248. What objection have you to that plan?—First, in north-west gales, I do not think it possible for a vessel to lay alongside the quays, from the width of the opening.

249. You see he says in his report: "It will be observed I do not propose to encroach on the shore included in this harbor by the construction of any wall, but I leave it open as a basin on which any waves that may find their way in may break and expend themselves?"—I made the same provision in my outer harbor. I left the shore naked, as it is at present, between the Chavonne and the Amsterdam batteries, and I also recommended that the north wall of the commercial basin should have a sloping front, so that the sea should expend itself on that incline, so as to prevent agitation as much as possible within.

250. Mr. *Barry*.] The narrowing of your entrance would have a great effect?—Yes; Mr. Rendel's entrance, I see, is twelve hundred or fourteen hundred feet; fifteen hundred, I see, by the scale.

251. Mr. *Jarvis*.] Mr. Rendel says in his report: "This being the case, it is clear that the north breakwater should not be less than thirty feet high above low water, if it is to oppose an effectual impediment to the sea breaking upon it, and tranquilize the harbor, as well as offer some shelter to the hulls of shipping anchored under its lee. Experience at

Holyhead and Portland (places where the waves rise, certainly, sixteen feet above the level, and the tide has a range of eighteen feet at the former, and eight feet at the latter) further shows that the sea-slopes of these breakwaters adjust themselves to a slope of five to one from half tide, to fifteen feet under low water, with rapidly but regularly decreasing slopes above and below those points. I have, therefore, to propose that the north breakwater should be designed in accordance with these facts. Its top being thirty feet above low water, and thirty feet wide; the sea-slope from the top to half tide, averaging one and a half to one, thence to fifteen feet below low water, five to one, and thence to the bottom, about one and a quarter to one, the inside slope varying from one and a quarter to one to three quarters to one." Now, this is different altogether to what you propose. You propose it shall wash on this, and fall into the harbor on the other side. Would not that have the effect of displacing the works at the surface?—No; not if it is properly laid.

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252. Would it not, more or less, agitate the bay on the other side?—It would under its immediate lee, but I do not propose any quay on this outer breakwater. I have seen the sea go clean over Plymouth breakwater. Mr. Rendel proposes a battery on it, but that is a purpose I conceive foreign to the purpose of a breakwater.

253. Mr. Rendel says the breakwater should be a defence, and in accordance with that opinion recommends the top to be thirty feet above low water, and thirty feet wide: would you propose something similar to that?—Plymouth breakwater is more like my proposal.

254. We have had evidence before us to show us it is necessary that the base should be in extent about three hundred feet, and the surface one hundred and twenty to one hundred and thirty feet?—At what level the surface?

255. Above high water?—Thirty feet above high water?

256. Yes; it is stated that the breakwater should have a surface of one hundred and twenty or one hundred and thirty feet: do you consider a work of that kind is absolutely necessary to stand, in Table Bay, the gales which take place here?—I do not think it necessary.

257. Then you prefer the one recommended by others—thirty feet at the surface and one hundred and twenty at the base?—The breadth of base will depend on the depth of water.

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258. What would you consider requisite to be the support at the base?—It would depend on the depth of water. I would carry from the surface line, where I would construct a curve on the work, ten feet above high-water mark, a slope from seven to five to one, to go ten or twelve feet below low water, then work on a slope of one to one to the foot.

259. But perhaps you do not consider a work of such magnitude would be necessary?—No, I think not. I have seen heavier seas in Plymouth Sound than here.

260. Would you propose, in any operation on that outer wall or breakwater, that there should be any opening for any purpose whatever?—Yes; I propose one opening near the shore for the passage of fishing boats.

261. What would be the breadth?—About sixty feet.

262. Supposing you were to extend it a little further than that, might not vessels that part, for instance, in a south-easter, run for it, or at least those vessels of little burthen?—I think not, for there are rocks immediately under the lee; not unless it was made considerably wider,—say two hundred feet; and looking at the question in regard to north-westerns, the harbor would be naked in proportion.

263. There is a survey going on at this present moment in Table Bay, as probably you are aware from having seen the flags in the bay: they have been laying down and pointing out the proposed outer end of the breakwater?—I have not.

264. You have spoken of convict labor: it has been represented to the committee that perhaps convict labor, if not found better than what is used at home, it would not be found advantageous to use them: you have had some experience of works carried on in this colony with convicts?—I have.

265. And your opinion is, I suppose, that they are fully able to carry out any such work as this?—Fully able; with the exception of matters in connection with the machinery we would require occasionally. All rough work could be done as well by them as by any men who could be got.

266. You have stated that the plant required to commence the work would be rollers, jacks, drums, and other things: you can commence the rails, or nearly so, with the materials in the possession of the civil engineer's department?—It is not a single line we should want. It would be probably right to calculate for a treble line.

267. But you have sufficient for a single line?—Probably there may be, but I am not prepared to say exactly; but there is no doubt plant would have to be procured before the work could be effectively begun.

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268. In the construction of this inner harbor, I suppose it is proposed that vessels should lay alongside the wall, at different portions of it?—It is.

269. Then how do you propose to construct that wall?—Founding with coffer dams the inside of it.

270. Would not that make it very expensive?—It is by far the cheapest way you could do it. I would not have perpendicular walls, but step walls, using rough blocks.

271. *President*]. Like Ramsgate?—Not so good; but I put several up in Malta and saved labor on the face.

272. *Mr. Jarvis*.] You have stated that you would keep the harbor clean by a dredging machine?—Probably; but I do not anticipate much silting.

273. But your idea is that it is an expensive work?—I have worked two or three in my time. In Malta, it lifted the mud at nine pence a ton, and it cost nine pence more, probably, to carry it away two miles from the works,—one shilling and sixpence, including everything except the first cost of the machine.

274. What would be the first cost of the machine?—About £3,000 or £4,000. And you must have costly men to work it,—engineers and assistants.

275. *Mr. Barry*.] Do you propose, then, to work it by steam?—Yes, by steam.

276. Would not a primitive affair be sufficient, or would steam be cheaper?—We had spoon dredgers at Malta, worked by hand labor with large drums. We worked them by working inside the drums, and thus wound up the spoons. But we made but slow progress; though, at the same time, they are excellent machines when you have corners to dredge out, which you would have in this basin.

277. The committee are then to understand that you feel satisfied that, with the means appropriated by the bill, the Government would be in a position to construct the outer or north pier, by which Table Bay would be secured and form a harbor of refuge for vessels throughout the winter?—I do. Here are my own sections on a reduced scale.

278. And you do not think that a work of such magnitude as shown in Captain Vetch's plan is required?—Certainly

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not. I consider Captain Vetch's plan as a dream almost : his wall to break the *wind* especially.

279. In fact, you would have no objection to undertake the work and carry it to completion?—You have a special engineer already.

280. That is not the question?—I do not like to trench on other people.

281. But supposing the Government——?—I sought for that appointment before my present one.

282. What would be the most desirable course,—for the Government to enter into a contract for the carrying out of the work, or carry it out with its own resources, reckoning on the able assistance which is at its command?—I like the system of contracts; but contracts, I think, should be thrown open as much as possible.

283. But when convicts can be employed?—Portland is worked with convicts partially.

284. But might not the contractor have doubts as to the efficiency of these men: would it not guide him in his tender?—Yes, there would be a sliding scale.

285. Could not the Colonial Government with men at hand, especially intelligent men, be able to have it done more economically than by contract?—I think it could.

286. *President.*] Do you anticipate any difficulty in getting the plant from England?—Certainly not. You could get £500,000 worth of plant readily, if wanted.

287. Without having a contractor in England?—Certainly. There is one great advantage of having contractors, however; you know what the cost will be, provided the contract is carefully drawn out. You will not have it done by English contractors without paying well for it, and that means extravagantly.

288. Well, but could not the work be gone on with by the Government here without reference to contractors?—Decidedly.

289. *Mr. Jarvis.*] What would be the particular works or articles requiring to be contracted for to carry out the work?—You would require a great quantity of iron and timber.

290. I was referring again to Mr. Rendel's plan, and he has made an estimate of the work near what you stated. He says that the north breakwater would require 2,260,000 tons of stone, at 2s. 6d. a ton, amounting to fully £28,600, which, added to the other expenses, would make up a total of

£302,000?—I think at Portland (I speak under correction), the cost of carrying and delivering stones at the head of the incline, by convicts, comes to about $7\frac{1}{2}$ d. a ton, half of the total cost of the stone when down at the bottom of the incline.

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291. Then his estimate at 2s. 6d. far exceeds?—According to the quantity delivered in; if large, the contractor can do it cheaper.

292. Mr. *Barry*.] You purpose having an opening between the shore and outer breakwater?—Yes, to give facilities to fishing boats

293. Do you not think the disadvantages would be greater than the advantages by the current through it and the consequent deposit of sand?—No; the rocks I mentioned before are bare there.

294. Do you not think it will draw a weight of water through the opening that would not otherwise be the case?—No, I think it would profit the harbor.

295. You think, then, it would be more likely to act in the way of cleansing the harbor than filling it up?—Yes.

296. *President*.] In case of south-easters, would not moorings have to be laid down to hold vessels?—Yes, screw moorings.

297. You have no doubt vessels would be secured safe from any violent south-easters?—No, not the slightest.

298. Mr. *Barry*.] Do you think, in south-easters, it is the power of the water or the wind, or both connectedly, that causes vessels to drive out?—It is, I think, the surge; and when the wind, after lulling, comes up in gusts, they drive back and part.

299. And the outer breakwater being erected, would not that counteract such action?—I think it would not to a great extent.

300. Mr. *Jarvis*.] It has been given in evidence that, taking the plan of Captain Vetch, where the outer bay is now fixed, vessels would be covered to the extent of nearly half the distance between Robben Island and Blueberg: you understand what I mean?—Yes, I think I do.

301. That where the flag is now fixed for the end of the breakwater, and you are standing in a position on the shore a little beyond the castle, you see that it covers half the distance between Robben Island and Blueberg: do you think that, for the protection of the vessels in this bay, such

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an immense extent is required in case of south-east gales?—
 No, I think it is very objectionable to enclose so great a space.

302. Then you are of opinion the space should be reduced?—Yes, by one half.

303. Then you would reduce the length of the north pier in proportion?—Not quite.

304. If you found that to be the case, perhaps you would think it would be necessary to even alter your present opinion as to the necessary length of your north pier?—Certainly. Captain Vetch and I agree as to the direction. If it were made to three thousand eight hundred feet, it can be stopped then or at any time it is found quite far enough.

305. Perhaps you might feel inclined to give the committee some further information after satisfying yourself as to those matters on which you are doubtful?—Yes, certainly.

306. Mr. *de Wet.*] Do you comprehend a light-house and not fortifications?—Yes, a light-house only.

307. What is the advantage of deviating from this line [A] and taking an angle?—I do not know what his object was. My object was to have an angular face for the sea to break on. My only object in having this opening was to convenience fishing and other boats (made at the suggestion of the Colonial Secretary), by saving them a detour round.

308. Mr. *Jarvis.*] You are well acquainted with the shore, perhaps, along here on both sides of the Chavonne battery: do you think that by having this opening here that a wash would be continually taking place by which any little débris that might collect would be cleared away?—Yes, it might to a great extent.

309. But you would not recommend such an opening as a vessel could go through?—Certainly not. This opening to the inner basin is also intended as a clearer, for vessels lying there might cause the water to get offensive.

310. Taking Captain Vetch's plan as a whole, is there no work going on in Great Britain at the present moment of a more extensive nature?—Dover harbor, I think, is intended to be larger. The breakwater there is two miles and a half in length. And the cost will be more in proportion than the one here, for foundations have to be secured with the aid of the diving bell, and they are most costly works. Holyhead is also very large, and Portland also will be very large.

311. But in connection with these works there are no inner works contemplated?—No, certainly not. At Holyhead, internal works existed, and have been enclosed, and the same at Dover. Very large sums have been expended at Dover upon the present breakwater.

312. Are there in any of the foreign countries that you are aware of works of such magnitude?—None. There are more extensive works at Cherbourg, but they are more of a military nature.

313. Algiers?—Algiers has not. There is Marseilles, Brescia, and Flushing.

314. You have seen those works at Flushing?—I have.

315. Mr. *Barry*.] Within the work proposed is there no locality that struck you for erecting a dry dock for repairing vessels in?—I have made provision for that about the ship-building yards, where slips can be made.

316. Do slips answer the purpose of dry docks in every respect?—No.

317. They are only applicable to vessels of a certain tonnage?—They can take large vessels, but with that view there would be great expense.

318. Do you know any particular locality—did any strike you where it would be likely to be adopted?—There might be a dock inside, but I never looked at it with that view.

319. Could not part of the inner basin be availed of?—I think in this neighborhood you might have a dock, and you contemplate a slip between the Clavonne and the Amsterdam, but it should be well protected.

320. What would be the expense of a dry dock to receive two vessels of five hundred or six hundred tons each?—Malta dock was made for a line-of-battle ship (and that must be about the length you require) at a cost of nearly £150,000. There we had about the same difficulties to contend with as to want of tide. There is a rise of two feet occasionally, but that depends on the wind. It had also to be excavated in rock, and was enclosed by a coffer dam.

321. Which is the cheapest plan?—It depends on circumstances; there is good material to be found here for a dock.

322. If the material is found good, of course it will lessen the expenses?—Yes.

323. Mr. *Jarvis*.] With reference to this plan [C], the commercial basin is forty-five acres: is the depth laid down in feet?—Of course, feet.

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324. At high or low water?—At low water. The soundings were taken by Captain Belcher.

325. No large vessels could go in there?—No; not without lightening.

326. Are you satisfied that you can deepen it?—I have no doubt of it. At the central jetty we have gone three or four feet below the surface.

327. You have stated all the expenses of the construction of this work: of course, it would afford no protection whatever as a harbor of refuge?—No, not the slightest.

328. Mr. *Mosenthal*.] Have you drawn sketches of similar harbors before?—Yes, several.

329. You are quite acquainted with the requisites?—I was brought up under the Rennies, and I have been connected more or less with almost all the harbors in England.

330. It has been stated to us that we could not conduct even a small work without a contract: are you of that opinion?—Certainly not.

331. But having already so much to do, could the colonial engineer find time to superintend a work of such magnitude?—Yes. Give me proper assistance (as I said before a committee on my department), and I could do five times the work.

332. What is the length of your breakwater?—Five thousand four hundred feet.

333. Would the royal navy derive any benefit from a work of that kind?—Yes, they might be induced to visit Table Bay, but with Simon's Bay under their lee, I do not think they would prefer ours.

334. You are aware that all provisions have to be sent from here for the royal navy in Simon's Bay?—Yes, I am.

335. Would they not come round here, then, to avoid that, if there were a construction of that kind?—They might, undoubtedly.

336. Even without a dry dock, if Table Bay is secure, we may find some spot to repair vessels, which at present there is not?—There would be greater facilities for heaving down, and for securing them better.

337. Much greater facilities than now?—Yes, it is dangerous at present, I think.

338. How many men would you advise to be placed on the works to carry them out in an efficient manner, without much delay?—Five hundred or six hundred. It

depends on whether the inner works are to be carried out simultaneously.

339. No, the outer breakwater?—Well, five hundred or six hundred.

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340. How many skilled laborers amongst them: how many convicts would you use amongst them?—Perhaps five hundred out of the six hundred.

341. One hundred skilled laborers to import?—I do not think you would want one hundred. I am looking at the superintendents as well. You would want men well acquainted with, and accustomed to, blasting, and men to manage the trucks on the inclines.

342. And when these six hundred men were at your disposal, and all the money, how many years would it take to finish it: I speak now of the outer harbor and of your plan?—In about four years we might do the outer work. The quicker it is done, the better—cheaper and better for the work.

343. Five thousand four hundred feet?—Yes.

344. Is it necessary to go to the whole width recommended by Mr. Coode?—I do not know what he recommends.

345. At highwater mark one hundred and twenty feet, which is a difference of four hundred per cent. between that and the original estimate?—I should not recommend that. If I were the contractor, I should say the wider the better, for there would be more material required.

346. In case of an European war, by placing a fort at the outer entrance, would not Table Bay be more secure?—I am not a military engineer.

347. I mean could it be done? Could a fort of any magnitude be placed there?—Undoubtedly; with money you can do anything. At Malta, I saw a low-water fort upset completely by a sea. It was fifteen feet above low-water mark, and yet the water took off walls, guns, and everything.

348. But we could have a fort?—Undoubtedly, one could be constructed.

349. Could you give us a rough guess at the cost?—No, I could not.

350. Could the Mouille Light be abandoned?—I recommended, in 1854, to have one light at the pier-head, and do away with the light ashore at Mouille.

351. And large steamers could not go ashore there?—

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They could see the Cape light in coming in, and see the Green Point light, and the light intended to be erected on Robben Island, and that would be ample for every purpose.

352. For the scaffolding, would you use colonial wood?—We might; but it is very costly.

353. I mean yellowwood?—No, not for waterworks.

354. I mean all the works out of the water?—To stand three or four years in the water, I would not use it on any account.

355. Would you use any colonial wood at all?—If I got it at a reasonable rate; but not at the rate I have been buying wood lately.

356. Do you know sneezewood?—I do not know that I could get the size that I would want. Twelve inch square would be requisite, and sneezewood is only nine inches square, about.

357. Then you could not use the colonial wood to any extent?—I cannot say that, for when there is a large demand, more timber might be brought in.

358. Would you use stinkwood?—I might, if I got the size. It stands well in water.

359. Swedish deal is impregnated with creosote; could our yellowwood be so impregnated?—Undoubtedly it could, and it would be to our advantage to do so.

360. And yellowwood?—Yes, yellowwood.

361. How long would it stand then?—For ever.

362. Well, we can get any size of yellowwood?—Well, you would have to put up a tank and import creosote.

363. It has been stated to us that it would be only with great difficulty that creosote could be imported: could you get the necessary quantity?—I have no doubt we might import it in iron casks. We can get the creosote for next to nothing, and in some parts of England they pay for it being taken away at large gas works.

364. Would you require any large machinery to construct your tank?—No, very simple.

365. And not entail much expense in building a house of solid granite?—I do not understand.

366. To prepare the wood?—The building itself is of a secondary nature; you want your tank, and slides for the timber, and receiving tanks, &c.

367. Then we could use colonial wood?—It ought to be an open wood to take the creosote well, for the closer it is

the worse it is to take the creosote. And it ought to be thoroughly dry before putting it in the creosote.

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368. At present there is a great deal of time lost in discharging ships during the summer season, through the constant blowing of the south-easters, and I want to know whether, by spending this quarter of a million, some contrivance could be made for facilitating the discharging the ships alongside the quay, or otherwise?—In these violent south-easters you cannot communicate with the vessels. That northern arm alone would not afford any protection. It would, in fact, make the place more dangerous for vessels parting, as they would go on shore instead of driving out to sea. The *Boscawen* would have run on it.

369. Would the moorings give way?—The best of moorings give way sometimes.

370. In this estimate there is nothing included in the way of giving any facilities in loading or unloading?—If this outer work is resolved on it would be desirable to carry on the other at the same time to make the thing complete.

371. Would you advise us to commence at once, having capital at our disposal?—I should say undoubtedly, and not lose time.

372. Is the winter season or the summer the most desirable time?—Summer, undoubtedly. The finer the weather, the better for the works, especially in the beginning. If you have not men to complete all, the work could be curtailed.

373. Mr. *de Wet*.] If it were extended only some way you think it would have a material effect?—Yes, if only carried out to the first cant, it would improve the anchorage.

374. By carrying out the wall eighteen hundred feet, the vessels lying at anchor would be protected?—Yes, for comparatively, every stone will have an effect.

375. *Chairman*.] What do you think every foot of stone would cost?—Well, taking it by the cubic yard, eight pence, probably, for quarrying.

376. How many assistant engineers do you require on this work if the colony were to undertake it with your assistance?—That is the north wall alone?

377. Yes?—One good man, one chief engineer.

378. What salaries have you to pay, about, per year?—My idea is, pay a man well and he will work well.

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Scott Tucker.
 ———
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379. Yes, but an able man?—An able man,—well, Mr Andrews agreed to come for £800 a year.

380. You could get a man for that?—I think so.

381. Do you require any seconds?—Yes, probably two superintendents, to act as draughtsmen and superintendents.

382. And you would pay them the same as on the railway?—Yes. The first thing to be looked at is a good foreman, which is the most difficult thing to be got—a good working foreman.

383. *President.*] You would find no difficulty, perhaps, in getting men from Portland?—I am afraid Mr. Andrews will not carry home a good report of the place, and that might act as a check on men coming from Portland, but amongst other contractors' people we might get good men.

384. Yes, the sort of men you require, and whom it would be very difficult to find here, and those are the hardy fellows who would have to go the first to put down the piles; they are generally smugglers, fellows half amphibious and half landmen. You could get these in reasonable numbers by paying them say 10s. or 15s. a day; and divers to go down in the water; I think they could be got at 15s. a day?—Yes, we would want them.

385. *Chairman.*] You would have no difficulty in importing timber!—No; we could do it cheap, in large quantities.

Mr. *Piers* called in and examined.

Mr. *Piers.*

386. *Chairman.*] I believe you are the Superintendent-General of Convicts?—Yes, I am.

387. Have you any convicts whom it would be advantageous to place on the breakwater?—Probably there would be in a fortnight one hundred and thirty convicts at Port Elizabeth for whom there is no immediate employment.

388. How many are there altogether?—At this moment there are about one thousand, or there will be in the course of the session; fifteen at the Kowie works, seventy-five at Woest's place, one hundred and five in Graham's Town, one hundred and twenty-five at Paardepoort, three hundred at the Knysna, one hundred and ninety-five at Tulbagh Kloof, one hundred at Fischer's Hoek, and thirty-two at Malmesbury.

389. If it were possible to concentrate them, would the

expenses be reduced?—Every separate establishment for convicts entails an immense expense in the shape of superintendents, the maintenance of discipline by officers, a number of night-sentries and other things, so that expenses would be considerably reduced by concentration.

390. Then would it be for the advantage of the Government to employ free laborers on the roads and the convicts on the breakwater?—I would not undertake to answer that; but the more the convicts are kept together in large masses, the better for their government; the better for the system, which could be carried out thoroughly.

391. *President.*] Would you be good enough to tell me this: you require a number of persons to act as warders or sentries at night, do you not?—Yes.

392. Supposing, then, that five hundred or six hundred convicts were placed on an establishment, could not the military be made available for the purpose of a night-guard?—There is an objection to the employment of military guards. We find that the military authorities and the civil authorities always clash, and the military guards never carry out their duties so well as men individually responsible to their own officers.

393. Then you think the military are not to be preferred?—I should not recommend it.

394. Not even at the external parts of the prison?—Outside the walls, to prevent escapes, do you mean?

395. Yes?—Well, they might do that; but I would certainly not allow them to have anything to do with the internal management.

396. My question was limited to the external guarding?—I think all could be much more conveniently done by our own people.

397. Would you not have greater facilities in finding that sort of people near large towns than in remote parts of the country?—I am sorry to say our experience is, that though we collect many men here for the service, they invariably misconduct themselves.

398. Supposing you have the principal station here, with five hundred or six hundred convicts, do you not think you could better maintain discipline?—We would have to offer higher wages and get a superior class of men: perhaps discharged soldiers and people of that sort.

399. Do you think convict discipline would be much

Mr. *Piers.*
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Mr. Piers. improved by that?—Yes, I think this should be the first consideration with the Government.

9th May, 1859. 400. And your impression is, if five hundred or six hundred were placed at a principal station here to work at the breakwater, their expense would be diminished?—Yes, materially diminished.

401. And discipline improved?—Yes, decidedly improved.

402. Do you think, also, that you could better carry out the system of reformation?—I do.

403. Mr. Jarvis.] Can you give the committee, Mr. Piers, any idea of the present expenses of each of these convicts?—Only within the last two or three years—since 1856. Last year was heavier than the year before, and I am afraid this year will be £4 heavier than last year. It will run up to to £38 or £39, I imagine.

404. To what do you attribute that?—In consequence of the extraordinary rise in the price of provisions. The expensive stations they are at, and the necessity of having a certain number of officers and head officers and night-guards have materially increased the expenses.

405. Supposing you had only two or three stations, what do you consider would be the amount to which you would reduce the expenditure: what proportionate amount could you reduce the expenses to?—I am not prepared to answer that exactly; but from the experience and knowledge I have acquired, and looking at the various papers, I should say that, by diminishing the number of stations to three, we might, I dare say, reduce the amount to what it was last year, notwithstanding the increased price of provisions. That is a hazard guess. But I find in the commencement of the system that a number of expenses were charged to our department were not included then, being borne by the Roads Department.

406. Then your opinion is, if there were only three stations, that you might reduce the expenditure, even counting the high price of provisions, to £32 or £33 per head?—Yes, that is my impression.

Committee adjourned to Thursday morning, instructing the clerk to invite Lieutenant Skead and Captain Wilson to attend.

Thursday, 12th May, 1859.

PRESENT :

Mr. WIGHT (Chairman),

Mr. Jarvis,

Mr. Mosenthal,

Mr. Barry,

The President,

Mr. de Wet.

Mr. *Francis Shead*, Master R.N., and Admiralty Surveyor,
called in and examined.

407. Mr. *Mosenthal*.] I believe you are in the royal
navy?—Yes.

Mr.
Francis Shead.
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408. I believe you have served her Majesty in various
parts of the world, in a similar capacity?—Yes; I have been
assisting in surveys up the coast of China, and the coast of
Scotland, and I may say I surveyed also on this coast ten
years ago.

409. You are intimately acquainted with the taking of
soundings, and you have also a knowledge of currents?—It
is my profession.

410. I believe the Government has commissioned you to
assist the two gentlemen from England in taking the sound-
ings for a breakwater?—Yes.

411. Have you done so?—I am now engaged on it. I
sounded one line, a mile and a quarter, along the line of the
proposed breakwater.

412. The north pier?—Yes.

413. Which is the most important of the surveys for a
breakwater (such as we intend constructing in Table Bay),
the depth of the water or the strength of the currents?—I
should say both are equally important.

414. Have you been engaged in sounding or ascertaining
the currents?—In sounding only. The currents will be
taken as soon as the weather will permit. All the soundings
will be taken first, and then the currents will be examined.

415. Then they are not examined yet?—Lieut. Dayman
was engaged here two months in taking soundings, and
ascertaining the direction and velocity of the currents, but
where the notes are, I do not know,—but I should think at
the Admiralty.

416. Here, or in England?—In England.

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417. Lieutenant Dayman, of the *Mænder*?—Yes; my predecessor.

418. And was there no data previous to the investigation of Lieutenant Dayman?—None, that I am aware of.

419. Are these two months' labors of any value to you?—Decidedly.

420. How long will it take to ascertain the currents in Table Bay, for the purposes of this breakwater?—I should say fully twelve months, for they should be observed the whole year round.

421. But are the observations before us of no value as a basis for your labors?—I should think no engineer would risk a breakwater without data to work on.

422. And at present you say you have none?—None.

423. You have been in correspondence with her Majesty's hydrographic office?—Yes, on this subject; but privately. I wrote eighteen months since to the hydrographer, suggesting that these observations should be undertaken.

424. Captain Washington?—Yes; but it was in a private letter,—nothing officially.

425. Has the astronomer royal done anything to ascertain the currents?—Not that I am aware of.

426. Without these scientific observations, we have a sketch before us of an artificial wall, of various engineers, including that of Captain Vetch. We have abandoned the other works of Captain Vetch, because his scheme embraced a capital of more than we have by a million, while this is only a quarter of a million, for which we thought we could secure Table Bay against the north-westers, namely, an outer pier. Now, I find that the outer pier, for protection against the north-westers, on both sketches before us, describes an angle of about ninety. If we have no scientific observations as to the rate of the currents, which have not been commenced, and which require fully a year, how do the engineers come to the conclusion that the breakwater should be constructed at an angle of ninety: why not one hundred and twenty, or a greater angle?—Captain Vetch, I imagine, must be in possession of some data, on which he schemed his line of wall.

427. But you say there is none?—None, that I am aware of. I have made inquiry, but cannot find any.

428. Do you mean by observation,—the measuring of the waves?—These are also of value.

429. The velocity of the waves?—Yes; the height and velocity of the waves. Mr.
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430. The volume of sea, I imagine, driving in from the South Atlantic?—Yes, coming in; and I should say it was highly important to ascertain that. 12th May, 1859.

431. And if we had these exact observations, do you think that there is a likelihood of the angle being altered?—I think it is possible.

432. The angle of one hundred and twenty would naturally prolong the line?—Yes.

433. Thirty-three per cent., the difference between ninety and one hundred and twenty?—About that, I should say.

434. And if we prolong it five thousand eight hundred feet, that would naturally augment the capital necessary for constructing five thousand eight hundred feet, like three to four, because it would be one third longer?—You must then increase the length of the wall.

435. Is it possible that unless we have scientific observations with reference to the current that the basin which we now possess would be spoilt?—I think it is possible.

436. It might silt up?—It might. From experience, we know that near the causeway the whole of the soil is carried away from the eastern side, leaving the rocks naked. Captain Wilson told me that, two years ago, the wall opposite to the port office was covered with sand, but since the pier was run out, it has been carried away. The same has been observed in different places; wherever there is a projection the soil has been carried away.

437. Then we must calculate that the line of the north pier has been drawn by various engineers with a guess in regard to the currents?—Unless they have this data.

438. [Mr. Barry here read part of the report of Captain Vetch, showing that valuable information on that point had been received.]—I am aware of that; I have those papers.

439. You are aware of the papers which have been sent home?—No; I have never seen them, nor have I any idea what they contain.

440. But you are well aware that the currents of Table Bay have not been truly ascertained?—Not to my knowledge. The observations made by Lieutenant Dayman, no doubt, are most minute, as far as they go.

441. Supposing there were observations of this scientific officer, with reference to this question, extending over two

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or three months, in what proportion would they stand to the observations of which you spoke, as having to extend over twelve months: could it not be deducted, like a rule of three,—if such takes place in three months, what will take place in twelve?—No; the opposite season of the year might be the very reverse. The current during the summer season may run immediately opposite to its direction in the winter. It is the general direction and the velocity of the current you want.

442. And if a passage were left between the land and the artificial wall, and thus increasing the velocity of the sea through the narrow passage, would the sand be drifted out?—I cannot see how it would increase the velocity of the water at all. It would be so very small as to be of but little value as a scouring power.

443. Do I understand that the sea, as soon as expended, loses its strength?—Yes; immediately outside,—immediately it is clear of the opening, its force is destroyed entirely.

444. By what scientific means do you ascertain the currents,—by diving, or sinking bottles, or how?—I should allow a cask or some vessel to find its own gravity at the depth you intend to try the current, make a small buoy fast to it, and put it overboard, and then follow it in a boat.

445. And that would require twelve months?—Yes; you cannot otherwise give a correct result.

446. Not by deduction?—I should think not.

447. Supposing this proposition to be given,—during one month, could you deduct and say, if such takes place during two months, could you not come to any conclusion as to the whole?—None.

448. Do you require any theodolite or philosophical instrument for the purpose of ascertaining minute details?—No; I am possessed of everything of that kind. I am amply furnished by the Admiralty with everything that may be wanted.

449. If, in consequence of the current being different to what we suppose it to be, would the artificial wall have to be altered?—Decidedly.

450. Shortened or lengthened?—It is impossible to know till you see the direction of the current. It is the very basis on which an engineer must found his opinion with regard to the shape and the extent of the wall.

451. I suppose the soundings are all taken previously?—

These are taken from Sir Edward Belcher's plan. I am now taking them afresh. There is a difference as far as we have gone already. Nearer to the shore, the water is deeper; and at the end of the proposed breakwater, it is three feet shallower.

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452. Which would make a difference in the calculation of cost?—As far as the depth of water, it is necessary to enable the engineer to calculate the quantity of material; a knowledge of the currents is necessary for ascertaining what should be the length of the breakwater.

453. Are you acquainted with the currents on the coast?—Not intimately.

454. Are you acquainted with the current setting in from Natal to Cape Receife?—Yes.

455. And from there to L'Agulhas?—Yes; and nearer, it sets both ways. I have been drifted from the mouth of the Buffalo, in eighteen hours, sixty-eight miles.

456. Where to?—Down as far as Cape Receife, west-south-west.

457. And are the currents perceptible from L'Agulhas to Hondeklip?—The current that sweeps round the continent is general; it may be slight at times, but it is frequently three or four miles an hour. In the *Hermes*, the other night, we found we had steamed many miles beyond the Cape, through that circumstance.

458. In Table Bay, what are the usual courses of the currents in winter time?—That is what we require to know.

459. But I mean, such as can be discovered from superficial observation?—It occurs to me that the current, during the winter months, sets in from the north-west to the bottom of Table Bay,—to the mouth of Salt River. That is what I believe, from what I have seen and heard.

460. And during the south-east season?—It sets in this way,—round from Three-anchor Bay, and Green and Mouille Points, and sweeps along the shore towards the Amsterdam Battery.

461. And where does it find its way out?—It goes all the way by the beach at Blueberg. I have been on the beach there, and seen baskets and bottles thrown from ships in Table Bay taken clean up there without a breath of wind.

462. And do these currents always disengage large masses of sand?—I am unable to answer that.

463. Is that part of your investigation?—I should say a

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very important part of it. I was engaged upon surveying, but I never made any regular observation of the currents and the moving of the sand.

464. The investigation of the currents,—does that come by investigating the drifting sands?—Yes; I should say here, at all events. I have surveyed the mouths of rivers and harbors, and where I have found thirty feet of water, I have afterwards known men to walk over dry land. At Natal, the current appears to have changed altogether, for the channel, instead of going to sea from the harbor, has turned at an angle eighty degrees different.

465. Did you detect any unknown shoals or rock?—No; all that was known before.

466. Did you not find a rock recently, not laid down?—That is twenty-five miles from Natal.

467. How long would it take, if an artificial wall were carried out, to secure Table Bay against the north-westers (the line of the artificial wall, by a great misfortune, was wrongly laid down): would it take a century before Table Bay would be silted up in a manner we could not foresee, or might it injure the bottom in a shorter time?—It would take a long time, I should think. There is very little drifting sand in Table Bay; I do not think there is much.

468. I do not mean, to dry up Table Bay, but to render it shallower than it is now?—It would take a long time, certainly.

469. Would the silting take place on the land side or the other side?—To judge by what we see already of the general direction of the current,—the current would clear the sand out of the bay and carry it away to sea, or deposit it at the back of the breakwater at the north side.

470. You have been master of her Majesty's exploring ship *Enterprise*?—Yes.

471. And you are intimately acquainted with her Majesty's navy?—Yes; I have been twenty-one years in it.

472. Do you think, if we constructed this wall and render Table Bay a safe harbor against north-west winds, it would benefit the navy?—Most decidedly it would; it would benefit all the navies of the world,—any ship that took shelter under it.

473. Could any line-of-battle ship come and lay under the wall?—Decidedly.

479. How many line-of-battle ships could be sheltered

under the wall?—I should say five or six. You mean allowing room for the merchant shipping?

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475. Yes?—Six or seven.

476. Independent of frigates and smaller craft?—Yes; I dare say it would hold a dozen ships-of-war,—frigates and line-of-battle ships. It would be a matter of simple measurement—a line-of-battle ship being allowed so much room to swing.

477. Supposing a heavy south-easter sprung up, as in the summer time, by what would she hold to?—If you had the wall, it would be necessary to put down stationary moorings, to be taken up once in six months and examined.

478. And could a ship hold on by it?—Yes; I should think so. In a south-east gale, I have known the *Wellesley*, seventy-four gun ship, blown to sea with a loss of three anchors, and the *Boscawen* also was blown out the other day. Men-of-war are not furnished like large merchant ships in proportion to their size; and their height out of water offers a larger surface to the gusts which come down from the mountain.

479. But supposing with the stationary mooring, the gusts came down, would she part?—There would be a “bridle” always attached,—that is, a larger cable than a ship generally carries.

480. By what does it hold on?—By the “bridle,” as it is called.

481. Does that give the ship more swinging power?—It depends on the length.

482. Supposing she was to break from her chains, where would she go?—Undoubtedly, on the breakwater.

483. Consequently, we must lay down moorings, as, if she parted, she would go, after all, on the rocks?—Men-of-war are always furnished with three anchors, and everything should be ready for dropping them at once. Men are ready with the ropes, and a fresh anchor can be let go on the instant. That would be particularly observed when a ship was inside the breakwater.

484. Have we any means of building a pier sufficiently long and just in sufficient depth to allow vessels to lie alongside in south-easters?—Where do you wish to run it from?

485. From the shore: do you think there is a place in Table Bay from which we could construct a jetty sufficiently long, and with a proper depth of water, to allow vessels to lie alongside during south-easters,—for now they lie eight or

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ten days sometimes, doing nothing: I would like to know if there could be any means for their lying alongside and discharging?—You can do anything you like with money. There is no reason why you should not run a pier out to bring ships alongside. But that again, would be affected by the current. If the current sweeping from Fort Knokke round the beach, past the Chavonne, has the effect of clearing the sand out on the south side of that wall,—if you mean to have the pier from the landing jetty here (the coal jetty), and run a distance out for ships to come alongside and discharge, you would cause this north side of the pier to fill up; that is, if the current sets in this direction,—which I think it does.

486. What do you think of the opening which some engineers have proposed between the land and the sea-wall for fishing boats: do you think it advisable?—I think the expense would be enormous.

487. Why?—Because there must be masonry, and facing the sides of the opening.

488. Do I understand, by masonry, cut stones?—Yes; I should think so, though I am not an engineer.

489. And by running out from the land without this opening, all masonry would be done away with, and the wall would be cheaper?—I should say so, most decidedly; but there could be no objection for fishing boats going outside,—it is not a mile. And if it is blowing south-east, they are under shelter, and the pulling round would entail very little extra work. I see no reason why an opening should be made.

490. Have you been in any British or foreign colonies where they have constructed similar water-works of such magnitude?—No, never.

491. In Australia?—I have never been in Australia.

492. Nor in America?—I have seen none.

493. Have you been to North or South America?—Yes.

494. Any in the Dutch East Indies?—I have never seen any extensive work out of England.

495. You have seen all the English works?—I have seen Holyhead and Plymouth; at Ardrossan, they are smaller works comparatively.

496. Have you seen Portland breakwater?—No; I have never seen it.

497. If you were to commence these soundings now, would you require the *Hermes* or other man-of-war steamer to be at your command?—No; the Governor has placed the

port-boat at my disposal, and Captain Wilson very obligingly furnishes me with all I want. A steamer is not necessary; I can do in a boat perfectly well; in fact, part is got over already; I have got marks put up, and I am only waiting for fine weather to carry on the soundings.

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498. With reference to the currents?—No; it would be better to have a steamer, and so get them all over the bay.

499. During twelve months?—Not observing all the time, but as it may be convenient.

500. Do you think the admiral would consent to place a steamer at your disposal?—He may not have one.

501. It could not be done in boats?—It could; but it would be very awkward if a gale of wind came on when half way to Robben Island. These currents would be investigated mostly during fine weather,—it is preferable; but they must also be observed during heavy gales. The *Hermes* might be at anchor in the middle of the bay, and we could make observations during heavy weather,—and those would be the valuable ones to get.

502. From the shore, could nothing be done by observations and instruments?—No.

503. Can you do it simultaneously with the taking of soundings?—No; you must pay attention to one thing at a time.

504. How long will it be before you finish the soundings?—It depends upon the weather,—probably a week or ten days.

505. You could then begin with the currents?—Yes; but I shall have to get orders from the commander-in-chief, if I am to undertake it. It is at the request of the Admiralty that I am doing this. But there is other work cut out for me, so that the commander-in-chief would have to give me orders respecting the currents.

506. Would it take the whole of every day during the year?—No.

507. How many times per day, supposing you begin in June, 1859, and to deliver your report in June, 1860?—It would vary, different times during the day; but I would require to be close to or somewhere near Cape Town.

508. Three times every day, I imagine?—Yes; that would be quite sufficient,—eight o'clock, noon, and four o'clock in the afternoon.

509. Would you instruct subordinates?—Yes; a petty

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officer could be entrusted with it just as well as the Astronomer Royal.

510. By giving him instructions?—Yes.

511. It becomes entirely mechanical, like heaving the lead?—Yes; just so. A man who can read and write—a trustworthy man, that is all.

512. Mr. *Jarris*, Did not Captain Belcher take a survey of the soundings of Table Bay?—Yes; this is it.

513. Are you aware whether he took the soundings in a regular survey?—Yes; to judge by his plan.

514. And the currents also?—No; nothing is said about the currents. He was not long in making his survey, and we now find differences in depth. Whether or not the bay has filled up since, I cannot say, but there is three feet difference at the outer end of the proposed breakwater, to what is marked on his plan.

515. And you stated that towards the Chavonne Battery, it is two feet deeper?—Yes, more,—five feet deeper. But that is only one line; it would require more soundings.

516. I believe you have sounded out to the extent of the proposed breakwater?—Yes; from the shore, this line has been sounded a mile and a quarter.

517. And are you aware what portion of the bay for the anchorage that would cover, supposing the breakwater extended out to that distance: supposing you were standing at Fort Knokke, and looking at the extremity of the breakwater, what proportion of Robben Island and the main would be covered by it?—The breakwater there appears to be more than two thirds across, namely, between Robben Island and Blueberg.

518. Do you think, then, for the protection of the anchorage of Table Bay, it will be really necessary to extend the breakwater to the length proposed?—I do not think it is an inch too long. The sea comes in from true north, and the ships lie with their heads so, and the sea and the wind would impinge on the breakwater there at right angles.

519. Are you aware whether the port-captain has ever taken any account of the currents in Table Bay?—I do not know whether he has recorded it. It can merely be by his observations in going from one ship to another.

520. I see you have surveyed the shore here beyond the Chavonne Battery?—Yes, I intend to carry the triangulation on to Green Point and Mouille Point.

521. And did you find much sand there, or what was the nature of the shore?—I have not examined this thoroughly, but there appears to be very little sand all along this coast. There is a little shingle inside the rocks, but very little sand.

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522. Of course you are aware that it blows south-east during six months of the year, and consequently an immense quantity of sand must be blown into the bay?—Yes.

523. What is your idea,—where is the sand drifted by the current?—It must be carried out into about the centre of the bay and deposited there. It is observed during a south-easter that there is a very strong current inwards from the Chavonne, passing the Amsterdam and port-office, and which subsides again immediately it is over. But these are points that require investigation. I learned from Captain Wilson that at no time, during heavy north gales, is the sea so bad, or the wind so high that a boat is prevented from going off with an anchor and cable; and if ships part from their anchors, it shows that the holding ground must be good.

524. You have stated, supposing the outer pier was constructed and a landing jetty run out from the shore, would there be protection sufficient for vessels to be anchored alongside, and to discharge even in a strong south-easter?—Yes, I think so.

525. What distance would such a jetty require to be extended to?—Eighteen feet at low water would, I think, be sufficient, for very few ships that come here to discharge draw more than that.

526. Could you give an idea of the length of the jetty that would be required?—About two thousand five hundred feet, to take it into eighteen feet at low water.

527. How would you recommend it to be constructed—a jetty on piles or a wall?—I would certainly recommend an open jetty on piles, and in that way, not interfere with the direction of the currents towards the main breakwater, as the water could flow between.

528. You said, supposing it should be a wall, it would fill up the outer anchorage?—Yes.

529. *President.*] You are aware that a work of this kind has been under consideration for many years.—Yes.

530. Have you seen all the plans which have been suggested?—I have never studied them, but I have seen them.

531. Do you know that many engineers have concurred

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in the idea of having the breakwater from that point?—Yes, it is considered the best.

532. There is not much difference of opinion, then?—I think there is room for none.

533. You say it is very important to watch the course of the currents: does that importance arise in reference to the question of silting?—Yes.

534. Entirely?—Yes, entirely.

535. A heavy sea sets in here from the north-west, from which you get protection?—It is about north north-east, by compass true north. The ships that come on shore from their anchorage, are beached near to Fort Knokke, which is about a north and by west true line.

536. Would not the angle of the breakwater be determined immediately by the force and direction of the heavy waves that come in.—Yes.

537. Should not a person who proposed such a work endeavor to witness a storm?—Yes; I should say it would be valuable for forming an opinion.

538. I dare say you are aware that several of the gentlemen who laid down plans had that opportunity,—we asked Mr. Tucker, for instance?—I am not aware whether he has witnessed a north-west gale.

539. Well, your predecessor had an opportunity?—I do not know if he actually witnessed it.

540. Captain Washington is the head of the department?—Yes; the hydrographic department.

541. Have you the slightest doubt of Captain Vetch having examined all the winds there?—A paragraph of his report has been mentioned, on which his plan has been furnished.

542. Could not the observations be made as the work proceeded, and during the preparations?—Yes; but I do not know how long it would take to prepare before commencing the wall. I am not an engineer.

543. At Portland, about a year?—In that case, twelve months would suffice.

544. Would the inquiry be with a view to consider the propriety of leaving an opening?—No; the direction in which the wall should be thrown down.

545. Could not the wall be carried in the direction indicated by the observations made during the progress of the work?—I mentioned a year as being necessary,—perhaps at

the eleventh month we could have a correct result, but it would be more satisfactory to have the year.

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546. No great progress could be expected up to that time?—I should imagine not, if they take a year to prepare.

547. I suppose very correct soundings have been taken?—I am at it now; I have finished one line.

548. Do you find the soundings marked on the chart tolerably correct?—As far as I have gone, the water is deeper in shore, and at the other end three feet shallower. But in the course of a week or ten days, I will be able to furnish the soundings correctly reduced to the lowest tide.

549. Are you likely to be here for a year?—I think not.

550. Then you would require orders from head-quarters?—I will have to get orders, of course. It is at the request of the Admiralty I am now taking soundings.

551. Mr. *Barry*.] From the knowledge you have acquired during your short survey, do you think the breakwater will prove prejudicial to the present anchorage ground?—I cannot speak positively, but the opinion I entertain is that it would not.

552. On the plan, the line proposed is only a slight curve?—I think it would make but little difference in the general direction, which should be from west to east. I do not think the slight curve put in would lessen the shock.

553. Do you not think that, in the summer season, vessels could anchor outside with safety, and unload at the breakwater?—No doubt.

554. And would not the anchorage be safe there for large ships?—I am not aware of there being sudden shiftings of wind, but if the wind did suddenly change, the large ships or men-of-war, anchored outside, could run in for safety.

555. Can a wharf be made on the north side of the proposed breakwater, so that steam ships touching here for coal, and anchoring outside the breakwater, might receive their coal from boats loaded at that wharf?—Yes; by a wharf, I mean that a landing-place for that purpose might be made on the breakwater itself, and not a separate wharf in addition to the breakwater. The sea would break over this in north-west gales, but it would not be required during the north-west season.

556. Vessels are detained here more in summer than in winter. Could they not anchor there?—Yes, with

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perfect safety. The holding ground is good all over the bay, I believe.

557. *Chairman.*] From your knowledge of Table Bay, what would you suggest for the mercantile marine: would you be in favor of this plan, or the plan suggested by Mr. Tucker, with an inner basin?—If the north wall be completed, I do not see what object you have in enclosing the lower part of the harbor. Of course, it would be desirable to keep vessels as in dock, but I do not see the immediate object of incurring such an enormous expense.

558. You would not construct any quays for vessels to come closer?—It would be desirable that a jetty, as suggested, should be carried out to eighteen feet at low water.

559. *President.*] Then you prefer the pier to a dock?—A dock would certainly be desirable, but a pier would prevent any silting up from the ground.

560. Mr. *Jarris.*] Have you any knowledge of the screw piles?—No, I have never seen them; I have read of them only.

561. *President.*] We have been told a chain would break before that would give?—It was proposed, I think, for the Downs.

562. I understood you to say that good moorings should be laid down to save vessels in south-easters?—Without doubt. The *Boscawen*, the other day, during a south-easter, was lying alongside the *Lord Raglan*, which, although longer, did not present half the surface to the force of the sea and wind as the other, and therefore held her ground, while the *Boscawen* parted.

563. *Chairman.*] Would it be desirable to have dry docks constructed?—It would certainly be most desirable.

564. Which would be the best situation?—I have not closely examined any part with that view, but I may be able to say more by-and-by.

[Captain Knox's plan for a dry dock put in.]

565. *President.*] Could a dock be made if the breakwater were abandoned?—Yes, it could be done; but I do not know what effect it would have on the merchant shipping, in drawing them here.

566. Mr. *Barry.*] Would it not be an inducement for them if they knew they could get repaired?—Yes; but it is a question whether the few that would come here for repair would bear any proportion to the number that are driven

away, by the knowledge that there is no shelter for them here.

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567. *President.*] As to that, things would remain as they are now?—Yes, about the same.

568. Mr. *de Wet.*] I believe your opinion is favorable as to the holding ground?—Entirely; I believe it is splendid.

569. And that would hold good in respect to moorings for chains?—Yes; the moorings would prevent vessels parting, as “bridles” would be used. In regard to the holding ground, it must be good, for none of the wrecked vessels brought their anchors with them, except one, and in that case it was found that the anchor was foul.

570. Is there any work in the possession of Government regarding the currents?—I am not aware of any.

571. As I understood you, there are two currents,—one setting in during the summer and another during winter?—That is what I would wish to have investigated; but there is a general rule that there is one current during the north wind and another during the south-east.

572. In almost opposite directions?—Yes; Captain Knox, in his plan, puts down a general current; but, as he only observed it evidently during north wind, he has rushed to an erroneous conclusion.

573. But supposing there are the two currents, would not the one serve to correct any effect produced by the other?—The direction of the obstruction (the pier) would still depend on the facts to be ascertained. If the current from the north on to the north wall, be stronger than the other,—the one going out in the opposite direction,—it would be a matter for consideration which would convey the most silt; and the form of the wall must also affect that. That is only to be decided by experience.

574. What makes you think it is absolutely necessary to have the opening left for boats?—I do not think it is necessary at all; they can as well come round the end of the breakwater.

575. *President.*] That is one thing on which your twelve months' experience would enable you to form a decided opinion, whether it would be desirable?—Decidedly.

576. Mr. *de Wet.*] Supposing your opinion was asked as to which would be the best means of securing the shipping against the south-easters, and at the same time to enable them to unload in all weathers, what would you suggest?—

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This wharf Mr. Mosenthal spoke of, carried out to eighteen feet at low water, moorings laid down, and the breakwater as a protection against the north-westerns.

577. Mr. *Mosenthal*.] Would you construct that jetty without a breakwater?—I do not know whether it would stand in a north-west gale.

578. Without the breakwater, then, this jetty would be insecure?—I am afraid so.

579. Mr. *de Wet*.] You are aware the central jetty stood well for two years?—But that is comparatively small to the one proposed.

580. Mr. *Mosenthal*.] From your long experience of her Majesty's dockyards, and as an officer of twenty-one years' standing, would you explain to the committee why, in England, these large works are done generally by contract and not by the Government?—I am unable to answer that. I know nothing of the subject.

581. *Chairman*.] Could you point out the place where the jetty should be run out from—the most desirable place?—That would depend on the soundings. You would select a spot where there is the deepest water near the shore, so as to lessen the length of the jetty.

582. *President*.] You might have a dock in connection with the work?—I cannot speak positively, from not having minutely surveyed the beach.

583. Mr. *Mosenthal*.] How much room must be left for a vessel swinging—for a vessel drawing eleven feet when loaded: if we were to have this jetty to enable brigs drawing twelve feet, to discharge, would you require six feet for water play?—Not if you have the breakwater, and without it, it would not stand.

[Mr. Skead then retired, and Mr. Smith, agent for the contractor, had a private consultation with the committee.]

Captain *Henry Wilson* called in and examined.

584. Mr. *de Wet*.] You are the port-captain?—I am acting port-captain.

585. Mr. *Mosenthal*.] You are aware it is in contemplation to build a wall for sheltering Table Bay against north-westerns?—Yes.

586. It is at present the soundings Mr. Skead is engaged in?—Yes.

587. Do you know of any observations that have been taken continually during two seasons of the year, with reference to the currents?—Not more than general observations—speaking as far as I am myself concerned. Capt. *Wilson*.
12th May, 1859

588. Are you aware whether other people have taken it? No, I am not aware. No survey of any portion of Table Bay has been made since I have been engaged in the port-office—the last eleven years.

589. Consequently, the plan, as to the currents, must be guess work?—Well, general observation and experience goes a great way in these matters.

590. Do you think our jetties could be lengthened so as to enable vessels drawing nine to thirteen feet to lay alongside?—No.

591. Would it be carried away?—Not carried away exactly, but no vessel could lay alongside on account of the undulation of the water—not one day in a month.

592. Would they be dashed against the pier in south-easters?—It is not the surface ripple that does the damage, but the undulating motion of the water that brings the two bodies together. I have tried it several times when bringing vessels alongside steamers, the agents being anxious to get them coaled. They were always glad to shove off, as otherwise considerable damage would have been done.

593. During the time of constructing this northern breakwater, do you think large vessels parting from their anchors in a south-easter would run on the artificial rocks?—I presume, if the breakwater is ever constructed, it would be carried out above high water, and that the water will not be allowed to wash over it.

594. But would ships, parting from their anchors in south-easters, run on the wall?—Some might do so: it is perfectly possible; but very few part in south-easters with ordinary care. I am now making returns for Mr. Smith and Mr. Andrews of all the vessels which have parted during the last five years.

595. In south-easters or north-westerns?—Both.

596. But should screw moorings be laid down while the breakwater is in course of construction, even large vessels will not part?—While the breakwater is in progress, most decidedly lines of moorings should be laid down, north and south, one looking to the north and another to the south; and so, in the course of twelve or eighteen months as the work

Capt. Wilson progresses, a certain radiation of moorings should be laid
12th May, 1879. down, according to the tonnage of the vessels and their draught.

597. In how many fathoms?—Gradually from close in shore, with proportionate room allowed for vessels of five hundred tons and vessels of two hundred and fifty, each placed according to its class.

598. Well, as the harbor works progress the moorings should be laid down?—Yes.

599. By constructing a pier here, if this harbor is constructed—from your experience of Table Bay, would you prefer this pier to be on piles, or made of solid masonry?—Well, that is an engineering matter. If it be made substantially, I suppose it would be for the purpose of having vessels alongside. Wooden piles would not stand long, and would cost a large sum of money.

600. Would Mouille light be still necessary when the light is erected at the end of the breakwater?—Yes, until the work is finally completed.

601. But I mean when all is completed, would it be necessary?—Yes, I apprehend it will, even then, because there is a considerable distance from Mouille Point to the end of the proposed breakwater.

602. And the Cape of Good Hope light and Green Point light?—Yes, both.

603. From what distance would this light be seen from the southward?—I laid a buoy with a flag, the other day, at the end of the breakwater (as proposed by Captain Vetch); it could not be seen from the southward; it cuts the Mouille Point about west-north-west.

604. But you could see it a long way to the northward?—It all depends on the power of the light. A light of the first class, such as it to be erected on Robben Island, would be seen twenty miles, being one hundred and fifty feet above the level of low water.

605. Do you not think, if we construct this breakwater, it will prove of the greatest benefit to the navy?—Yes, to all the navies of the world. I could not help expressing my surprise, when I went off with the boat to lay down the buoy, at the enormous distance the breakwater is to stretch across the bay. I am of opinion that something much shorter would answer the purpose admirably; for standing on the beach at Fort Knokke, and looking seaward, I took the bearings, and found

it was quite two thirds of the distance between Robben Island and Blueberg. I could not help looking at it with astonishment. Capt. *Wilson*,
12th May, 1859.

606. The buoy you have alluded to is five thousand eight hundred feet out in this direction, sheltering vessels like the *Great Eastern*. Now, supposing we were to have it only about half that,—say two thousand eight hundred feet, how far, then, would Table Bay be sheltered against the north-westers,—what portion of the anchorage would be sheltered?—The best portion of the present anchorage; sufficient for ships of one thousand tons, and even one thousand four hundred and one thousand six hundred tons (drawing the same water).

607. Well now, dividing that again by two,—say one thousand four hundred feet, how far would Table Bay be isolated?—Very little, then, against northerly gales.

608. Well, how far must we run the wall out, to shelter vessels ranging up to one thousand six hundred tons burthen: do you think two thousand feet would do it?—No; to make the harbor perfectly secure, it must be a little longer, for you see the waves come in from the north-north-west.

609. But with two thousand eight hundred feet?—Yes, probably that might do; but it must advance so far as to protect ships from the effect of the heavy sea from north-north-west. As far as my opinion goes, if two thirds of the original projection of Captain Vetch were carried out, it would be ample for the purposes of the port.

610. But how far would Table Bay be protected, during the progress of the work: do you understand?—A considerable number of vessels would be protected; the moment we could get protection for two tiers of vessels, there would be comparative safety.

611. Say one thousand feet?—I can hardly calculate the distance in feet; say two cables' length,—one hundred and eighty fathoms: we can put down two or three tiers of moorings.

612. The first thousand feet only in shallow water,—the deep water only commences from one thousand feet out?—True, but ships of eight hundred or nine hundred tons do lie in Table Bay in this anchorage, just a little this side of the Chavonne Battery. It is the favorite place for the mail steamers, and they lie in five fathoms water. We consider them secure.

Capt. Wilson 613. Do you mean high or low water?—I mean low water, but the rise and fall is very little,—not above five or six feet. The moment we get a protecting wall, we can put ships in shallower water.

614. During your long experience in the port office, did it ever strike you as being very remarkable that one side (the southern side) of the central jetty has been cleared entirely of every particle of sand, leaving all the rocks completely bare, while the northern side, where some rubbish has been thrown, has been entirely filled up?—There is a great diversity of opinion with regard to that. My opinion has been asked a good many times (by Lieutenant Dayman and others who have visited Cape Town), and I entertain a different notion to many, for I do not believe there is anything like the silting taking place that people think; for if you examine it, you will find in the winter months during bad weather, the sea undermines it, throwing down large pieces of the embankment, you will see the strata of the different material laid down, composed of old building material, sweepings, &c., with a slight layer of sand,—that is the north side of the jetty. There is a little silt, but nothing like what people imagine. I do not see where it is to come from; this is an iron-bound coast and there are no rivers in the vicinity. I have experienced the current hundreds of times, and I have found currents on the east shore of the bay, and I think eight or nine months of the year it sets out north-north-east, on the Blueberg side.

615. In what months?—I should think eight or nine months, principally during summer. In the winter months, when the wind blows from the northward gently but continuously, then the harbor gets full of water; the current sets out in the opposite direction; in fact, the currents, in my opinion, are entirely guided by the wind; they come in from between Robben Island and Green Point, and are thrown on to the other shore, near Blueberg round by the head of the bay, and go out by Mouille Point. I have noticed it by seeing vessels hawsed up to windward, and seeing stuff floating out in the direction I have described.

616. Which wind produces the strength of the currents on the South African coast?—I am only speaking of Table Bay. The prevailing current, no doubt, is entirely guided by the winds. By the south or south-west wind, the water is thrown bodily on the coast, and it rushes in and goes out

again by the north-east shore. Whenever it is going to blow a hard south-easter, the strength of the current is always a guide. Capt. *Wilson*.
12th May, 1859.

617. Supposing we stopped the current, blocked it up, what would be the consequence?—There might be a little silting but it would be very little.

618. But what would be the consequence of this?—I cannot say. The waves now come rushing on, up to the port office wall, and in the rebound draw everything with them,—that is during the winter months.

619. You say the currents come in here and go out there?—Yes, when it blows steady for three or four days.

620. Then, if we block this up, what will be the consequence during the three months?—Of course, it is a mere opinion on my part, but my opinion is that there is not that body of silt or sand moving about in the water to cause a filling up, and I do not think such a thing can take place.

621. Do you mean filling up or drying up?—If there be a shoaling of water, we will only have to use dredging machines like in other harbors.

622. Do you approve most of an opening being left in the breakwater or its being connected directly with the land?—That is an engineering question. It might act as a safety valve in case of any tendency to silting; but on that question of silting there seems to be but very little unanimity of opinion.

623. Unless there be scientific proofs?—Yes.

624. It stands to reason that the angle of the breakwater at one hundred and twenty, will carry away the sand much more than if it were seventy-five or seventy?—That is true, but if you put the angle more acute on to the north-east, instead of to the east, you have less protection, or you must lengthen it. It is a peculiar fact that the old sunken wrecks in this bay (that have been there for ninety or a hundred years) have been worked by an intelligent man, a diver, and I have often spoken to him about their opening and shutting again. He says they open suddenly after heavy northerly gales and are perfectly clear; but in the summer months they shut up. I am speaking of the old wrecks in the direction of Fort Knokke.

625. Mr. *Jarvis*.] You gave evidence before a select committee of the House of Assembly, three years ago,

Capt. Wilson, respecting the tides and currents?—I think I did; I also 12th May, 1859, gave my opinion, in Mr. Montagu's time, with regard to the laying of moorings, which were then thought to be necessary.

626. It has been stated in evidence, to-day, by Mr. Skead, taking, I think, Captain Belcher's plan as a foundation, that he finds that, near shore, the water has deepened in some places, to the extent of five feet while, his soundings at the end of the proposed breakwater show him that the water is two or three feet shallower: how do you account for that?—If you are to take Captain Belcher's chart of Table Bay as a basis, I cannot certainly account for it, but I doubt very much whether his soundings were literally correct. I very much doubt it myself (not that I would presume to doubt Captain Belcher's ability, far from it). I have heard it discussed amongst mercantile men, and I believe generally understood, that it was a mere running and hurried survey. Correct soundings, such as this is supposed to be, would require two or three months. They may be correct, but I hardly think it. There always was a patch of ground here generally resorted to by old shipmasters, between the Amsterdam and the Chavonne, a little more to east and by north, where ships lie in a most extraordinary manner, in a measure free from violent seas,—in a line from the Amsterdam.

627. We have before us several plans for constructing this pier: from your experience, and looking to the safety of the shipping, which would you recommend?—That one —[Mr. Scott Tucker's]—the pink mark. It would do if we get as far as that outer bend, which I consider to be far enough for the protection of the anchorage. We could then place our coasting vessels on what is now lost ground. I was very much surprised at the distance the other proposed plan went out, and I thought some mistake had surely been made. I never entertained an idea it was going so far; such a length is unnecessary, and a mere waste of money.

628. There are certain other works which have been recommended here: would you recommend either of these, or any portion of them, to be constructed in connection with that work, looking at the advantages,—the safety of the port, and the facilities to be given to vessels loading and discharging?—I think a kind of basin or dock might be advantageously constructed. I think so for many reasons. I could not say on what scale, but sufficient to allow of

steamers to get in (with an open entrance), and run along-side the quay; and inside there might be a graving-dock or a patent slip. Capt. *Wilson*.
12th May, 1859.

629. Mr. Skead has recommended that if the pier runs out to eighteen feet water, with a pile jetty, to let the water flow free underneath, that to such a pier, even during the strongest south-easter, vessels could be brought to load or discharge: do you think such could be done,—supposing, of course, the outer works would be so far extended as to offer a protection against the north-west gales?—A ship to hang to the jetty?

630. He does not say,—say by her moorings?—No; I am afraid not.

631. What is your objection?—I think the action of the water would be too great in a south-easter,—a continual bubble and swell; and I think the pressure of vessels hanging on a jetty built on piles would be too great,—I think it could not stand it.

632. Mr. Skead's suggestion is that it should be moved to leeward?—Yes; I am speaking as to leeward.

633. On the north-west side: might he not have it in contemplation that, supposing a vessel was placed on the north-west side, the action of the water through the piles of the jetty would be more or less broken, sufficiently so as to enable a vessel to be moored safely on the lee side of the jetty, to be discharged?—What class of vessel?

634. Of three hundred or four hundred tons?—It is perfectly possible that it might be done by having proper moorings to keep her in position, so that she should not hang by the jetty; but I very much question, if it would be safe to let a vessel lay alongside the jetty in violent winds; but if there were moorings laid head and stern, it might be done.

635. Do you think the piles, being the support of the jetty, would, more or less, break the force of the sea,—sufficient to enable a vessel to lay on the lee side?—I could not say that: if I am to take the present jetty as a criterion, I do not think it would do so. If you look at that in a south-east wind, it seems to offer but very little obstruction to the motion of the water.

636. We have had it suggested that if the piles were properly placed, you might even construct a breakwater from it, by which even the heavy sea would be broken?—By putting stones between it?

Capt. *Wils.* 637. No; by placing the piles in a certain position so that the action of the water against them would rebound, and the effect inside would be nothing!—It is perfectly possible, no doubt. The great desideratum, in my opinion, is to get this arm; and I think all this shore could be left to private enterprise, and I have no doubt we would soon see considerable improvements.

638. Supposing you have the protection from the northern gales, do you think it possible to erect works by which vessels could be repaired or hove down, or brought into a dock, instead of having, as now, to resort to other places?—Most decidedly; all we want, before we attempt to lay down a patent slip, is to stop the great influx of water coming in with northerly gales.

639. You think the first thing to do, is to carry out the northern arm!—Yes; that is paramount to every other consideration, in my opinion; and as the impression appears to have got abroad that ships would foul it, I may say that it might be so with careless shipmasters, but it would be the especial duty of the port-captain to take every reasonable precaution to prevent any such accident.

640. From your perfect knowledge of the bay, you think the first thing to be done, is to carry out the two lengths of the breakwater, as laid down in this plan of Mr. Tucker?—That is my idea, and I think it will be found to afford ample protection.

641. Mr. *Wicht.*] What other works would you suggest?—I was just going to observe with regard to ships parting in south-easters, that the majority that part are large ships; invariably it has been found that those which part are heavy ships. There is always an undulating motion of the water, more or less, coming in from the south-west, which presses the ship up between the squalls, allowing, as it were, the ship's chain to drop down under foot; the gusts of wind striking the hull and spars, the ship tightens her cable, gets stern way, the strain increases, the chain snaps, and away goes the vessel. That is acknowledged by every man of experience.

642. If the outer arm were constructed, would this part [pointing to the northern side of the breakwater] be sheltered?—Yes; I would make it a practice to put vessels here in the summer season, knowing that there would be little or no fear of northerly gales.

643. Could a jetty be run out from there?—I am afraid the action of the water would destroy everything. I would like these gentlemen to see a gale, before they go away, so as to give them an idea of the sea that rolls in. Capt. *Wilson*.
12th May, 1859.

644. From your knowledge of the accommodation required for the mercantile marine, what works would you suggest inside the arm?—I think something in the shape of a dock,—even a dry dock, to allow vessels to be repaired,—that is the great want we experience. It is quite distressing to see fine ships going away, merely because they are unable to get repaired here, some with half cargoes, others with extra pumps, &c.

645. You are familiar with Captain Knox's plan: where would you place a dock?—Between the Chavonne and Amsterdam batteries, because the water is deeper there than anywhere else.

646. What is your opinion with regard to this basin proposed by Mr. Tucker: would that afford accommodation?—It is very good, there is no question of that; but we must have the outer breakwater. Whenever that is accomplished, it would be the duty of the port-captain to suggest the laying down of additional moorings, and that would be a source of emolument to the port, for all ships will be only too glad to avail themselves of them, as a security against drifting and fouling in south-easters; in reference to which I may add to what I said before, that the wind does not come along the water, but drives down angularly; therefore this extended arm would be of little or no use, besides occupying the best part of the anchorage.

647. In case of such works being carried out, in your opinion, is there any fear with regard to the silting up?—No, I should think not.

648. In your opinion, would it be desirable to have accommodation of that description?—I do not say that exactly, but anything in the shape of a dock; something where we could take a ship in. Of course, private individuals, the moment we get a protecting arm, will adopt all requisite after measures for their own interest, and contract for works, the same as at the Mauritius.

649. Mr. *Jarvis*.] It has been suggested that dredging should be made use of to counteract the silting and to ensure the deepening of the port: have you ever seen anything of

Capt. *Wilson* that kind done anywhere?—Yes; I have seen dredging machines used, particularly in Liverpool.

12th May, 1839. 650. Would you recommend it?—That is an after consideration, if there should be any fear arising from the discharge from the sewers

651. It is recommended to go on deepening after the works are constructed?—There is this to be considered,—the bottom is a hard blue mixture of sand and mud. For instance, when anchors, which have lain in the ground for a considerable time, are recovered, this bluish stuff is found sticking on the pea of the anchor,—a kind of clayey mixture, and extremely hard. The diver told me that in walking along the bottom, he has found the ground quite hard.

652. Mr. Tucker suggests to deepen his other proposed inner harbor two or three feet by dredging: from your knowledge, do you think it would be desirable to adopt such a course in Table Bay; whether, apart from expense, there is any reason why it should not be carried out?—It might be done, but I question whether a dredging machine would have that power here which it has on other bottoms, for this ground is of too hard a nature. The level would be always gained again, and any movable matter would gradually lodge there.

653. Then your opinion is it could not be done?—No; I would not like to give a decided opinion on that point. It may be possible, but I do not think the machine would make much impression on such a hard ground.

654. His plan is to dredge it all round and deepen it, say to twenty feet?—I do not think you could get down eight feet; I do not think any dredging machine would operate. At the extreme end of the jetty they experienced the greatest difficulty in making any impression with even pile driving,—the blows not seemingly driving them down an inch at a time. As a proof of the firmness of the ground, we seldom or ever see a ship, well found, driven ashore, and if they do it is always the chain that snaps. I have known only of one instance to the contrary in eleven years,—the bark *Morayshire*. She drove stern on; she was laden with timber; and after recovering the anchor we found the chain was round the flue.

655. Mr. *Wicht.*] Vessels would be secured against south-easters?—Yes; when the General Screw Steamship Company's steamers used to trade here, we laid down moorings, and we had the greatest difficulty afterwards in lifting them.

656. Mr. *Jarvis*.] The committee is to understand that you approve of Mr. Scott Tucker's plan as far as the two arms for the breakwater?—If you will allow me,—I was not aware when I spoke of the line, whose plan it was. Capt. *Wilson*.
12th May, 1859.

657. But you approve of that, and you disapprove of the other south-east arm here described, as you consider it unnecessary?—I do not think, in my opinion, that it is necessary for the present.

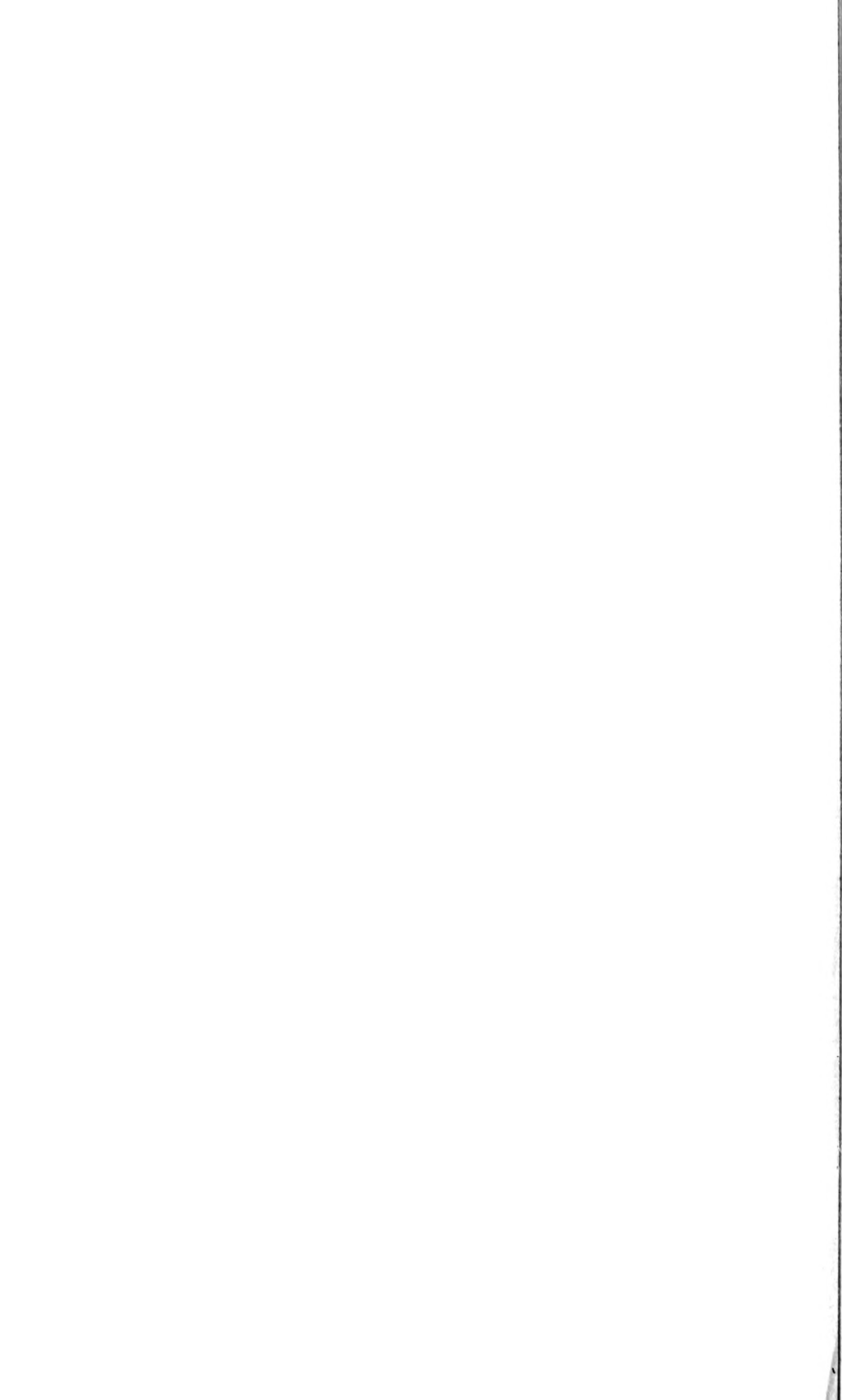
658. And this other harbor, you think, could not be dredged to the extent of twenty feet?—I do not think that eight or nine feet of the solid material could be taken out by dredging machines, the ground being of so very hard a nature.

659. Mr. *Wicht*.] From your knowledge of Table Bay, would you advise the carrying out at once of this outer arm?—Most certainly,—most decidedly; it is much to be desired that the work should be commenced without delay, so as to put a stop to the serious losses of property we now sustain.

660. Vessels might come inside here and receive their coals and water?—A quay might be made, but it would be attended with a large expense.

661. Mr. *Jarvis*.] The proposed plan is that the surface shall be three hundred feet broad, and, therefore, seeing the upper structure is only thirty feet, it would extend very angularly down to the base: do you not think it could be so made inside as to admit of vessels discharging alongside?—Yes, it is perfectly possible. In Genoa you see vessels loading, moored stern on close to the mole with cables crossed, out of each quarter.

662. Mr. *Wicht*.] If I understood Mr. Andrews right, he wanted to commence a little further to the north: do you think that would be any advantage?—The only advantage I can see, would be the giving of more room in the harbor.



APPENDIX.

A Return of working days lost, through bad weather, at Table Bay, from 1st January, 1854, to 31st December, 1858, &c.

Months.	1854.		1855.		1856.		1857.		1858.		1859.	
	S.E.	N.W.	S.E.	N.W.	S.E.	N.W.	S.E.	N.W.	S.E.	N.W.	S.E.	N.W.
January	6	.	2	.	2	.	4	.	3	.	3	.
February	3	.	1	.	5	.	3	.	1	.	5	.
March .. ..	.	2	1	1	1	1	3	.	4	.	4	.
April	2	.	2	2	3	.	.	.	3	2	4	2
May	1	2	.	1	3	2	1	1	1	1	.	.
June .. ..	.	4	.	4	.	8	.	8	5	3	.	.
July .. ..	.	6	.	4	4	4	.	6	1	2	.	.
August .. ..	.	4	1	11	1	5	8	.	2	4	.	.
September	2	7	3	6	1	5	8	.	1	11	.	.
October	2	4	1	2	2	.	1	.	3	1	.	.
November	5	1	1	.	10	.	2	1	6	.	.	.
December	3	.	4	.	2	1	4	.	4	1	.	.
Total	24	30	16	31	34	26	28	16	34	25	.	.
Total each year	54		47		60		44		59			

H. WILSON,
Acting Port-Captain.

Port Office, 9th May, 1859.

Number of Wrecks which occurred during the last five Years ;
amount of Loss, from January,

Estimated loss,	Vessels' names.	Tons.	Whether wrecked or got off.
£			£
	Australian (sc. st. ship) ..	1200	Hove off .. 4000
	Canopus (bark)	331	Hove off .. 1500
	Granger (ship)	878	Do. 1000
800	Sea Gull (brig)	365	Do., abandoned ..
	Jovan Dolores (bark) ..	215	Do., stranded 1200
	Maidstone (ship)	938	Do., do., .. 500
	Annie Jane (bark)	333	Do., do., .. 500
20000	Kent (ship)	815	Wrecked
6000	Sea Eagle (Dutch ship) ..	625	Do.
4000	Zalt Bommel (Dutch bark) ..	624	Do.
20000	Timor (Dutch bark)	500	Do.
700	Miner (schooner)	35	Do.
20000	Defence (bark)	810	Do.
800	Newport (bg. b.)	116	Do.
1000	Isabella (brig)	104	Do.

Dates when they occurred, Wind, Tonnage, and probable 1854, to December, 1858.

Date.	Wind.	General Remarks.
1854 Mar. 30	S.E.	In entering Table Bay, at one a.m., ran on shore, half cable's length to the westward of Mouille lighthouse.
July 15	N.W. gale ..	Hove off, on the 27th July, without damage, parted both cables.
Do.	Do.	Do., 10th August, without damage.
Do.	Do.	Do., afterwards condemned.
Dec. 11	S.E.	Ran on shore, in beating into the anchorage.
1855 April 20	Calm	Drifted on shore, stem on, on the east side of Robben Island, during the night, in a calm, no look out.
June 6	N.W. gale ..	Parted, and ran for the beach, was hove off without damage.
Do.	Do.	Parted, and drove on shore near Paarden Island, broke up next day.
1856 Nov. 20	S.E. gale ..	Missed stays, and struck on the east side of Robben Island.
Dec. 3	Light winds ..	Struck the rocks near the Chavonne Battery, and became a wreck.
, 22	Fresh S.E. ..	Ran on shore, during the night, on the south side of Robben Island, when beating up to the anchorage.
1857 Feb. 5	S.W. wind ..	Capsized and sunk.
Mar. 6	S.E.	Ran on shore, in beating up to the anchorage, on the east side of the bay.
June 6	N.W. gale ..	Parted ; went on shore near the Castle Battery.
, 7	Do.	Do., do., do.

Number of Wrecks which occurred during

Estimated loss,	Vessels' names.	Tons.	Whether wrecked or hove off.
£			£
1000	Gitana (brig)	96	Wrecked
4000	Christabel (bark)	335	Do.
5000	William James	293	Do.
3000	Ellen Rawson	311	Do.
1000	Isabella	146	Do.
	Jessie McFarlan	244	Do. .. 1800
	Rory Brown (bark)	199	Hove off .. 1500
800	Fox (cutter)	51	Total wreck
3500	Rastede (Old. bark)	462	Do.
	Kepler (Brem. bark)	567	Hove off .. 200
18000	Arabia (Am. bark)	382	Wrecked
2000	Malabar (Sard. bark)	650	.. .. ..
3000	Arago (Han. bark)	630	.. .. ..
	India (bark)	560	Got off .. 200
2000	Oste (Han. schooner).. ..	120	Wrecked
116600			£1480
14800			
131400			

This estimated amount of loss, by total wrecks, is as near the truth
The estimated amount of expenses incurred in repairs and getting

9th May, 1859.

the last Five Years ; &c.—(*continued*).

Date.	Wind.	General Remarks.
June 7	N.W. gale ..	Parted ; went on shore near the Castle Battery.
„ 10	Do. ..	Do., do., do.
„ 10	Do. ..	Do., do., do.
„ 14	Do. ..	Do., do., do.
„ 14	Do. ..	Do., do., do.
„ 7	Do. ..	Do., do., do.
„ 7	Do. ..	Do., do., do.
„ 20	Do. ..	Parted ; drove on shore near the Castle Ditch.
1858		
Mar. 5	S.E., fresh breeze	Ran on shore, near the new Salt River mouth.
April 26	Do., do.	Ran on shore, on the east side of the bay, 357 Chinese coolies.
May 10	Light airs and calms	Struck the blinden, half cable's length to the westward of Mouille light, and became a wreck.
Nov. 4	S.E., fresh breeze	Ran on shore, in beating up to the anchorage.
„ 30	S.E., do.	Do., do.
1859		
Feb. 22	S.E., do.	Do., 8 a.m., do.
Mar. 20	S.E. and N.W.	Do., one of the finest nights possible, moon near the full.
<p>as can be ascertained. affort is stated in the fourth column.</p> <p style="text-align: right;">H. WILSON, Acting Port-Captain.</p>		

Mr. CHISHOLM, Senr., relative to BREAKWATER.

Cape Town, October 10, 1826.

GENTLEMEN,—It is no doubt obvious to you that, in order to restore or preserve the commerce and prosperity of this colony, some means of securing shelter for shipping in Table Bay against the north-west gales, must be attempted; for without safe and commodious harbors, no favorable trade can be carried on for any length of time; and in order to secure these advantages in other parts of the world, almost insurmountable obstacles have been overcome. From the number of accidents which have of late years occurred, unattended though they may have been by any material loss of life, Table Bay has become to the ship-owners, under-writers, and even to the most experienced seamen, an object of dread: even vessels passing to and from India wanting refreshments have preferred inferior and imperfect supplies at other ports to the superior accommodations of this colony, because of the great detention and risk. This, to the agricultural neighborhood, as well as to the industrious tradesmen of Cape Town, has proved in itself no small loss. Captain Knox, whose abilities as a practical and theoretical seaman no one can dispute, has so ably pointed out, in his letter to the home Government, as well as the colonial Government, the dangers to which ships are liable in Table Bay from the vast body of water rolling in with a north-west wind, that I shall not dwell on the utility of a plan for obviating them. The obstacles are neither many nor of great magnitude; and, as the Cape has lately come much under the consideration of the home Government, I am led to hope that any plan presented by the Trade Committee, suggested by you, or having your approbation, would meet with attention and encouragement. Having had some experience in these undertakings whilst employed under John Rennie, Esq., civil engineer, my wishes for the prosperity of the colonists induced me to draw up two plans and estimates, the one for a dock at Three-anchor Bay, and the other for a breakwater and dock off the Chavonne Battery. I have, however, found that the formation of a dock at Three-anchor Bay would prove too expensive, and be too distant from the town for the purposes of trade. I, therefore, wish to direct your attention solely to the breakwater and dock at the Chavonne, marked A in the accompanying plan. This breakwater I propose will run directly from the battery in a north-east direction to a distance of one thousand yards, where there will be five and a half fathoms at low water, breadth of its base, two hundred and ten, and sixty feet at top. This slope will give it more solidity, and the waves will rise on the incline plane with less violence than if built more perpendicular, and may be with more propriety termed a causeway with a quick deepening shore: there might, also, be a light-house at the extreme point. The excavation which it would

be necessary to make in forming the breakwater, if begun at high-water mark, will, by throwing out a coffer-dam to secure the workmen, form a dock of eleven hundred feet in length, by five hundred and sixty feet broad, having twenty-two feet water at low tide; it might, also, have a dry-dock at one of the ends, in which vessels of any moderate size could be built or repaired. By building store-houses, as in the docks at home, goods could be warehoused without trouble or much expense. Combining, as this does, so many advantages, and costing but little more, it were evidently better to take the opportunity of forming a dock than that the excavation should remain a stagnant pool. And for this purpose, I further propose that a pier be run out a distance of four hundred yards on the south-east side of the breakwater, forming an entrance to the dock [see letter B]. As the trifling difference of six feet between high and low water does not render a pair of gates at all necessary, vessels can pass in and out at all times, be able to unload and load in a few days, and will not be subject to the detentions which at present must occur in south-east and north-west gales, &c., &c. There is little fear that any great accumulation of sand will take place at the entrance into the dock. Sand only deposits largely in situations where the flux and reflux are great, or where there is a meeting of a tide and a current. Should it, however, be found to accumulate, a dredge, similar to those in use in our harbors at home, can easily be applied. I entertain no fears on this head, owing to the tide advancing and receding but slowly. The expense I estimate the breakwater and dock at will be as follows:

The breakwater will contain	...	...	453,825	cubic yards.
The south-east pier, and sinking the entrance,				
equal to...	...	...	57,774	„
<hr/>				
Total	...	...	511,599	cubic yards.

Which, supposing the labor of one man equal to one half cube yard, per diem, will employ 500 men, nearly seven years, say:

	£	s.	d.
500 Convicts' food and clothes to amount to			
£18 each, per annum, for seven years	63,000	0	0
8 Masons, do., £75, do. ...	4,200	0	0
4 Smiths, do., £75, do. ...	2,100	0	0
4 Assistants to do., £50, do. ...	1,400	0	0
4 Wheelwrights, do., £75, do. ...	2,100	0	0
1 Clerk of the works, do., £100, do. ...	700	0	0
1 Superintendent, do., £400, do. ...	2,100	0	0
1 Pumping-engine ...	400	0	0
24 Horses, food, &c. ...	1,000	0	0
Expense of tools ...	2,000	0	0
10 Tons of iron, per annum, £12 per ton ...	840	0	0
<hr/>			
Carried forward	£79,840	0	0

	£	s.	d.
Brought forward ...	79,840	0	0
Half a ton of steel, do., £40, do. ...	140	0	0
500 lbs. of copper, do., £5, do. ...	175	0	0
10 Tons of coals, do., £12, do. ...	210	0	0
3,000 lbs. of gunpowder, 1s. 3d. per pound ...	1,212	10	0
Wood for platforms, carts, barrows, inclined planes, &c., say £1,000 per ann. ...	7,000	0	0
A coffer-dam ...	1,500	0	0
2,000 Barrels of Roman cement, at £1 5s. ...	2,500	0	0
A dredge machine ...	1,500	0	0
Iron railway, cranes, &c. ...	1,500	0	0
Lock-gate for dry dock ...	1,200	0	0
Swivel-bridge near the entrance ...	600	0	0
Total ...	97,377	10	0

A grant of the House of Commons for £14,000 per annum, during the seven years, would thus render Table Bay a secure harbor, and in a great measure restore the commerce of this colony, at present calculating the vessels that trade with the colony at twenty thousand tons per annum, a saving of 5s. 3d. per ton, for loading and unloading in boat hire alone, amounting to £5,250 per annum, independent of the loss ships sustain by detention, which will, in twenty years, be more than the sum as above required. The manner in which this expense would be repaid to Government, I leave, however, to yourselves to suggest. In the accompanying plan, I have marked the situation of a slip [letter D], on Mr. Morton's principles, should it be deemed advisable to have one; the expense of it will be greater than at first sight appears, as it would be necessary to construct the slip in such a manner that it might be drawn up and placed under cover, after vessels' repairs are effected, or else the salt water might destroy both metal and wood, so as to render it soon unserviceable. The rocky shore will need to be cut into an inclined plane, forty feet broad, and requires two piers, each two hundred and fifty yards long, by forty feet broad, as a channel with a coffer-dam thrown across the front. The quantity of building would be about twenty-two thousand cube yards, and the cost on a moderate calculation will amount to £5,500. Vessels, however, of five hundred tons, could be readily drawn up and repaired by means of it, as the depth of water at two hundred and fifty yards is at low tide two and a half to three fathoms. To conclude, in my opinion the greatest and most effective improvement to Table Bay, will be a breakwater and wet dock, from which slips or dry docks may be constructed.

I am, &c.,

JOHN CHISHOLM,
Senior Engineer.

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